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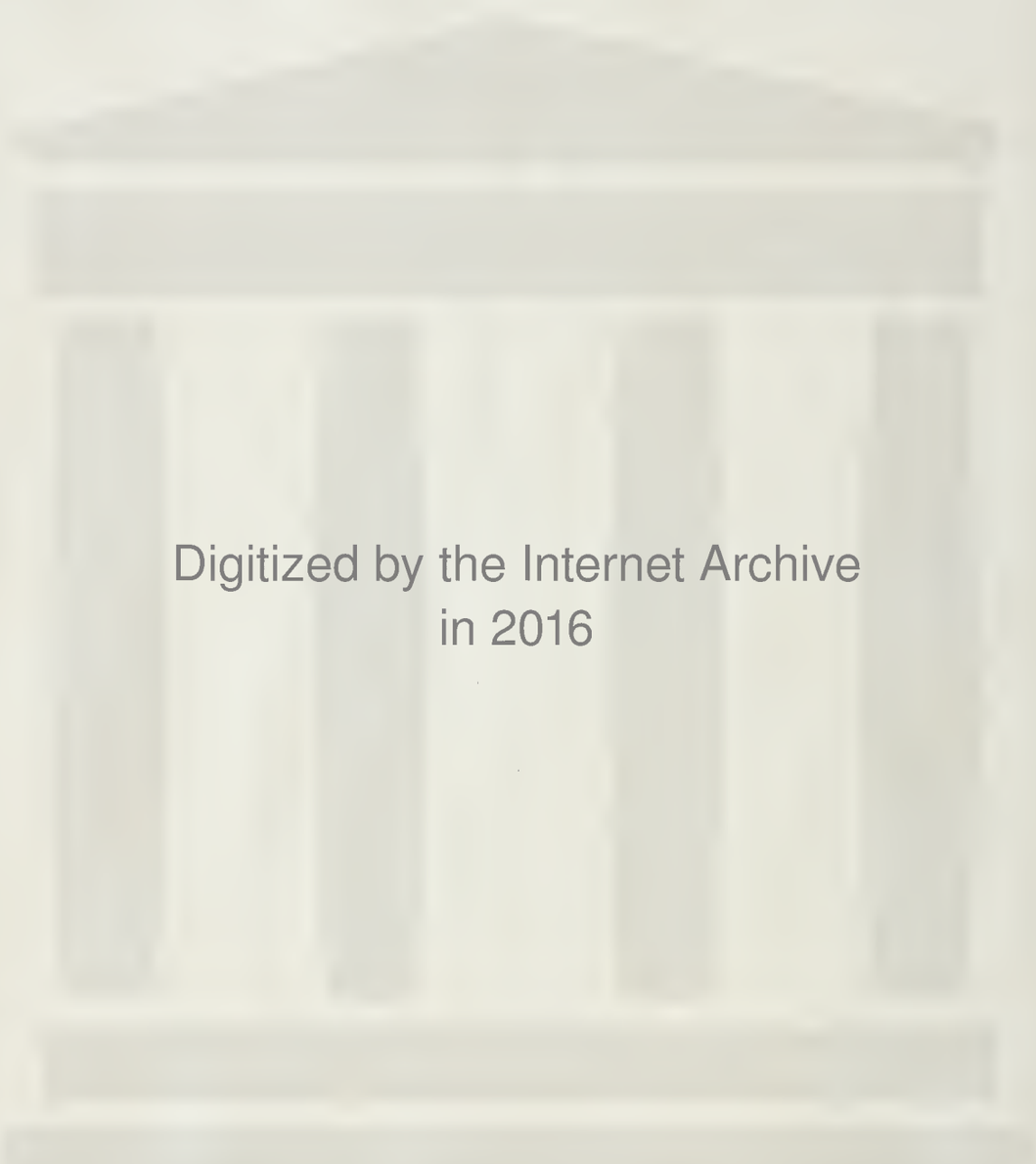

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BULLETIN

OF THE

BUREAU OF LABOR.

No. 79. WASHINGTON. NOVEMBER, 1908.

THE MORTALITY FROM CONSUMPTION IN DUSTY TRADES.

BY FREDERICK L. HOFFMAN.

INTRODUCTION.

The importance of dust as a factor in occupation mortality has attracted the attention of every authority on occupation diseases from Ramazzini to Thomas Oliver. It requires no extended consideration to prove that human health is much influenced by the character of the air breathed and that its purity is a matter of very considerable sanitary and economic importance. Aside from the risk of exposure to so-called air-borne diseases, the pollution of the atmosphere by organic and inorganic dust is unquestionably the cause of a vast amount of ill-health and premature mortality, but chiefly among men and women engaged in the many indispensable trades and occupations that minister to human needs. The sanitary dangers of air contaminated by disease-breeding germs are probably not so serious as generally assumed, while the destructive effects of the dust-laden atmosphere of factories and workshops are a decidedly serious menace to health and life. While the investigations of Doctor McFadden and Mr. Lunt seem to prove the paucity of bacteria in very dusty air, the evidence otherwise available is entirely conclusive that the risk to disease infection is much greater indoors than out in the open, where sunlight, rain, and wind in combination go far to purify the atmosphere by destroying the bacterial life contained in minute particles of suspended matter. Apart, however, from the transmission of disease through a dust-contaminated atmosphere, dust in any form, when inhaled continuously and in considerable quantities, is prejudicial to health because of its inherent mechanical properties, destructive to the delicate membrane of the respiratory passages and the

lungs. It has long been known that those who live most of their time out of doors have a decided advantage over those who, because of their employment, are compelled to spend their working hours inside the home, the office, the factory, or the workshop, and it is an accepted axiom of modern sanitary science that measures and methods for the prevention of dust are a first and preliminary essential consideration in rational methods of sanitary reform. All that sanitary science can suggest or that sanitary legislation can regulate and change should be done for humane reasons and as a matter of governmental concern to mitigate the needless hardships of those who suffer in health and life as the result of conditions over which they themselves have but a very limited control.

The importance of dust as a factor in occupation diseases has been emphasized by all who have written on the subject, but by no one more precisely and clearly than by Sir James Crichton-Browne, in his address on the Dust Problem, read at the Sanitary Congress held at Manchester, England, in 1902, from which the following is quoted:

The mortality of the principal dust-producing occupations, compared with that of agriculturists, who live and work in what is practically dustless atmosphere, is excessive to a startling degree. It is not suggested that this excess is to be ascribed to dust alone, no doubt various factors contribute to it, but the facts that it is due mainly to respiratory diseases, that it is distributed amongst the several occupations pretty much in proportion to their dustiness, and that it has diminished in some instances where dust has been effectually dealt with, justify the conclusion that it is largely dust begotten.

Sir Crichton-Browne in continuation of his remarks pointed out that a detailed examination of the conditions of work in each of the 22 principal dusty trades brought out clearly the fact that the unhealthiness was born of or was primarily due to the dust inhaled by the workmen, and that there was always a well-defined relation between the death rate and the quantity and quality of dust present in the atmosphere. There is apparently no very material difference in the manner in which the different varieties of dust act upon the human organism, except where, in addition to mechanically injurious properties, the dust is of a poisonous character, which leads to diseases such as lead poisoning, phosphorous poisoning, anthrax poisoning, etc. Industrial mineral dust apparently acts with greater rapidity upon the lungs than organic dust, which is slower and more insidious in its operations, but in a general way follows similar lines. All varieties of dust, the immediate result of occupation, are, therefore, comprehended under the term of "industrial dust," which is specifically defined by Sir Crichton-Browne, as follows:

I select this dust for my further remarks because it is readily recognized and defined, because its pernicious effects are well marked and indisputable, because it is to a large extent, if not entirely, pre-

ventable or removable, and because the efforts already made to prevent or remove it have been rewarded with conspicuous benefit. And I still further simplify and abbreviate what I have to say by restricting my observations to those varieties of it which are dust and nothing more, which are injurious by their physical properties and mechanical operations, and not as poisons to the systems, chemical destructives of the tissues, or bearers of bacterial invaders.

A similar but even more restricted limitation has been adopted for the present purpose, and only such occupations will be considered in detail in the following discussion as expose to the continuous and considerable inhalation of metallic, mineral, and vegetable fiber dust, and in which the evidence is at least fairly conclusive that the resulting disease liability and mortality from consumption and other respiratory diseases is above the average for occupied males generally.

Preliminary to a discussion in detail of the mortality from consumption in dusty trades it may prove of decided advantage to those who do not have access to the original sources of information to present a brief summary of qualified medical opinion regarding dust as a factor in occupation diseases and mortality. In a course of lectures on Unhealthy Trades, delivered before the Society of Arts, London, in 1876, Dr. B. W. Richardson[a] placed injuries from the inhalation by the lungs of fine particles of solid matter, usually defined as dust, at the head of the causes responsible for industrial diseases, and from his discussion the following is quoted:

The term "dusts," as I would here apply it, includes all those fine, solid particles which are thrown off from various substances in the processes of manufacture or treatment of articles in common use in daily life, such as earthenware utensils, knives, needles, or mechanical instruments, like files or saws; or ornamental things, such as ornaments of pearl, ivory, and turned wood; or articles that are worn, of silk, cotton, hemp, fur; or things that are used for food, such as flour; or for creating warmth, such as coal; or for using as a supposed luxury, such as tobacco and snuff. These are only a few illustrations; many others will naturally occur to those who think on the subject.

The dusts which inflict injury are of varied quality, as will be seen from the brief sketch just given. They are also of varied effect in regard to the specific injuries which they produce. We may profitably study them divided into different groups, according to their physical characters, as follows:

(*a*) Cutting dusts, formed of minute hard, crystallized particles which have sharp, cutting, and pointed edges. These dusts are composed of iron or steel, of stone, of sand or glass, of dried silicates in earthenware, of lime, of pearl.

(*b*) Irritant dusts, derived from woods, from ivory, from textile fabrics, fluffs of wool, of silk, of cotton, of flax, and of hemp, from hair, from clay.

(*c*) Inorganic poisonous dusts, derived from some poisonous chemical compounds used for coloring artistic products, or for preserving

[a] Scientific American Supplements, Numbers 9, 10, 18, 19, and 22, dated, respectively, February 26, March 4, April 29, May 6, and May 27, 1876.

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organic substances, such as furs. These dusts are charged with arsenical salts.

(*d*) Soluble saline dusts, derived from soluble crystalline substances used for dyeing purposes. The sulphate of iron, copperas, yields a dust of this class.

(*e*) Organic poisonous dusts, which are thrown off during the making up of tobacco into cigars and snuff. These dusts carry with them particles of the dried tobacco plant.

(*f*) Obstructive and irritating dusts composed of carbon, of fine particles of coal dust, of scrapings of carbon or of soot, of dust of rouge, and of flour.

Whatever may be the kind of dust to which the workman is subjected, to whichever of the above named he may be exposed, the primary cause of danger lies in the circumstance that the fine particles are borne by the air into the lungs. They pass, wafted by the air, through the mouth and nostrils into the windpipe; they pass along the bronchial tubes; in some instances they reach and traverse the bronchial passages which lie between the larger bronchial tubes and the minute air vesicles, or they even reach the air vesicles themselves.

An American authority on occupation diseases has referred to the subject at some length in an article contributed to Buck's Hygiene and Public Health, printed in 1879. This writer, Dr. Roger S. Tracy, for many years registrar of vital statistics of New York City and sanitary inspector of the board of health, makes the following statement with particular reference to the special form or type of disease resulting from the inhalation of metallic and mineral dusts:

The disease comes on very gradually, like the more slowly developed forms of phthisis pulmonalis, and its duration may be extended over four or five years. It begins with the cough of irritation, dry and hacking at first, with very scanty expectoration, whitish and stringy in character; there is no haemoptysis, but sometimes nausea and vomiting in the morning. Auscultation at this time reveals puerile respiration, with occasional slight râles. The expectoration gradually increases in amount and becomes reddish, and soon after this tinge appears there may be haemoptysis. There is dyspnœa on slight exertion, and dullness over the whole chest, with weak respiration and mucous râles. There is no fever, and the appetite and strength are still good. If work is abandoned at this time recovery is not only possible, but in most cases probable. If work is continued, the lung tissue begins to break down, and cavities form near the apices. Expectoration is very profuse, and there may be severe hemorrhages. There is general dullness on percussion, and the last traces of vesicular respiration give way to sibilant, large mucous and cavernous râles. Fever is continuous, with evening exacerbations, night sweats, emaciation, insomnia, and great dyspnœa, soon followed by death.

Very suggestive also are the observations and conclusions of Dr. John Syer Bristowe, F.R.S., who in an address on industrial diseases, read at the conference on sanitary subjects held in connection with

the International Health Convention of 1884, discussed the effects of nonpoisonous irritants on the lungs, in part as follows:

Occupations which habitually expose the workmen to the inhalation of abundant solid particles that are incapable of solution or removal by the animal tissues or secretions, in many cases induce chronic diseases of the lungs, which are known as the asthmas or consumptions of the several occupations referred to, and tend very materially to shorten life among those engaged in them. Workers in coal mines and in copper mines, grinders, millstone makers, and flax dressers are perhaps especially liable to suffer from such causes. It is marvelous how tolerant the bronchial tubes and lungs are of foreign particles which are drawn into them with the breath. Wherever smoke impregnates the atmosphere, as in London and other manufacturing towns, its particles are conveyed in greater or less abundance into the lungs; whence some are expelled with the expectoration, which presents, consequently, a slaty or black appearance, while some get absorbed, and becoming deposited in the tissue of the lungs, produce in them that black mottling which increases with advancing years, and is well known to pathologists. Yet, as a general rule, the soot-studded organs remain practically healthy, and no clinical evidences of pulmonary disease manifest themselves. The same remarks doubtless apply to the inhalation of the siliceous particles of ordinary dust. The effects are different, however, when such matters are inhaled in large excess. * * * The symptoms under which the sufferers labor have some resemblance to those of chronic phthisis, some to those of chronic bronchitis and emphysema, for either of which they may well be mistaken. They consist in gradually increasing shortness of breath, lividity of surface, feebleness of circulation, and cough, with more or less abundant expectoration: to which, at a later period, general dropsy and haemoptysis may be superadded. There is generally a total, or almost total, absence of fever. The only methods, so far as I know, by which the irritative diseases of the lungs, just considered, can be lessened or prevented, are by providing good ventilation, and (when possible) by adopting methods to prevent the diffusion of particles or dust in the atmosphere which the workmen have to breathe. It is obvious, too, that since the diseases are insidious in their progress, and increase in proportion as the inhaled particles accumulate, it would be well for persons who present early traces of them to seek at once some other kind of employment.

The most qualified and extended discussion of the entire subject of the inhalation of dust, its pathology and symptomatology, with special reference to dusty trades, is by Dr. J. T. Arlidge, who, in 1892, published a treatise on The Hygiene, Diseases, and Mortality of Occupations. "Few, indeed," he argued, "are the occupations in which dust is not given off," and "in none can it be absolutely harmless, for the lung tissue must be just so much the worse, and less efficient for its purpose, in proportion to its embarrassment by dust." And in continuation:

What occurs to the ordinary citizen becomes magnified ten or a hundredfold to those engaged in dusty occupations, and more espe-

cially where the dust itself possesses noxious properties. But unless dust has this latter quality, it is remarkable with what indifference its inhalation is treated by the majority of workmen. In one sense, indeed, it is unfortunate that it does not, for the most part, awaken attention by any immediate tangible consequences. Its disabling action is very slow, but it is ever progressive, and until it has already worked its baneful results upon the smaller bronchial tubes and air cells and caused difficulty of breathing, with cough and spitting, it is let pass as a matter of indifference—an inconvenience of the trade.

Arlidge called attention to the fact that bronchitis, asthma, and fibroid and tubercular consumption ranked foremost in the causes of British mortality, holding that without doubt these maladies were largely attributable to the inhalation of dust operating per se, or in conjunction with constitutional proclivities and insanitary surroundings. In further continuation he remarked that—

Pathologists tell us of the presence of bacilli in tubercular disease, and favor the belief that these minute bodies are the cause of it. This notion may represent a whole truth or only a partial one; in my opinion, the latter. For I doubt if these bacilli actually develop phthisis unless there be some antecedent change in the vitality of the affected tissue; a change wrought by depressing causes connected with the mode of life, or with constitutional debility and inherited taint, or with the occupation followed; of which contributory factors two or more may cooperate. And assuredly the breathing of dust may be reckoned as one such of no light energy. In other words, I look upon a phthisical lung as one prepared for the germination and multiplication of bacilli, and not a primary product of those microscopic organisms, nor of the products of their organic existence.

The conclusions of Arlidge are summarized in the statement that "One practical lesson is to be gained by these considerations—namely, that persons predisposed to respiratory diseases and phthisis ought not to engage in dusty occupations."

More recently the entire subject of occupation diseases in their relation to workmen's compensation has been considered at length and in much detail by a British departmental committee appointed to consider the pressing and important question of workmen's compensation for industrial diseases. In its observations upon respiratory diseases, and in particular bronchitis, pneumonia, and phthisis, and their relation to occupation exposure, the committee concluded that—

Pulmonary disease manifests itself in three kinds or forms—as ordinary tuberculous phthisis, acute or chronic; as "fibroid phthisis," and as a mixed form when a tuberculous process is ingrafted sooner or later upon the fibroid. Fibroid phthisis is always a slow disease. It consists in a chronic reactive inflammation around the many minute foci of dust inhalation, which by coalescence gradually invades large areas, impairing and strangling the proper lung tissues in corresponding measure. Again, a lung so impaired is very apt to har-

bor bacilli, especially the bacillus of tubercle, by the influence of which it may be still further destroyed. Thus both fibroid phthisis uncomplicated and fibroid phthisis with the supervention of tubercle are in their nature occupational disease.(a)

The committee, in its final report, describes the typical forms of fibroid phthisis as induced by the inhalation of industrial dust, holding that—

The first symptom is a cough which insidiously, and for a while almost imperceptibly, becomes habitual. At first in the morning only, it gradually becomes more frequent during the day, and expectoration, nominal at the beginning, becomes more marked, though not profuse until the latter stages of the disease. Leaving out of account the more rapid progress of the disease in tin and gold miners, these symptoms of a negative phase of purely local damage may last for years—ten or fifteen or even more—without advancing to such a degree as to throw the workman out of employment or even to cause him serious inconvenience. At some period, however, rarely less than ten years and frequently more than twenty, of continuous employment, in a like imperceptible manner the breathing gets shorter and the patient finds himself less and less capable of exertion. Yet, even when the cough and dyspnœa have reached a considerable degree, there are no signs of fever, as is the case of pulmonary tuberculosis; the flesh does not fall and the muscles retain their strength and volume. Thus even at a period when the malady is fully established the general health may be but little impaired, and the patient may not be compelled to cease work. Herein fibroid phthisis presents a well-marked difference from pulmonary tuberculosis; and even if, as we have said, the disease becomes complicated with tubercle, yet the rate of progress may be determined rather by the character of the primary than of the secondary disease, though usually the supervention of tubercle hastens the sufferer into a more rapid consumption.(a)

The results of all these researches into an almost neglected field of preventive hygiene prove that occupation diseases, properly so called, demand the most thoroughly qualified and medical supervision of factories and workshops and the periodical medical examination and inspection of persons employed in recognized unhealthy trades. For, as the committee referred to points out, "If in the early stage of fibroid phthisis the workman leaves the dusty employment for work in agriculture or in other occupation in air free from irritating particles, the disease may be practically arrested; that is, although the part affected may proceed to obliteration, the disease would not extend to other parts of the lung, and the portion destroyed would be negligible as a factor of health and capacity."(b)

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[a] Report of the Departmental Committee on Compensation for Industrial Diseases, 1906, p. 13.

[b] Report of the Departmental Committee on Compensation for Industrial Diseases, 1906, p. 14.

The conclusion of this investigation, the most important official inquiry ever made into the subject of industrial diseases, fully warrants the view that while ordinary tuberculous phthisis can not be regarded as a disease specific to any occupation, fibroid phthisis in its latter stage, and when the history of the case is known, can be clearly distinguished from tuberculous phthisis, so that it may be regarded as an established fact that fibroid phthisis is a disease specific to the employment in certain trades, of which the committee mentions the following: Grinders, continuously using either grindstones or emery for the abrasion of metals, especially steel; potters engaged in certain processes; stone workers employed on certain kinds of stone, especially if not working in the open air; tin miners, in particular such as have previously been exposed to the exceedingly unhealthy conditions of the gold mines of the Transvaal; and ganister miners, including men employed in certain processes of ganister brick making. The committee did not arrive at final conclusions regarding persons employed in the slate industry, nor of employees in the working of asbestos, and many other recognized unhealthy trades, partly, no doubt, because of the limited scope of the inquiry and the paucity of conclusive statistical data. It is pointed out by the committee that it was not possible to separate the English death rates from fibroid phthisis from those of other diseases of the respiratory system, since medical men do not, as a rule, distinguish that disease when certifying the causes of death. It is clearly established by the results of the investigation that such a distinction should be made and that medical practitioners should qualify the death returns from tuberculosis in all cases where the death was the result of fibroid phthisis.

The committee, having arrived at the opinion that fibroid phthisis is a specific and distinguishable trade disease, concluded that employers might properly be required to pay compensation to their work people who contract it; but it did not, however, recommend the extension of the Workmen's Compensation Act to the disease for two reasons. The first was that owing to the long period of its development it would not be right to lay the whole burden on the employer under whom the workman had been serving during the twelve months prior to the incapacity. The other and more important reason was that for several years before the nature of the disease can be definitely diagnosed the patient may suffer from symptoms that while not distinctive are sufficient to prevent him from securing employment.

In the partly descriptive account of 42 occupations considered in detail in this article only the most general facts have been included to emphasize, as far as possible, the industrial processes productive of conditions more or less injurious to health in general and to the development of tuberculosis in particular. Authorities are referred to only as far as this has seemed necessary to clearly establish in the

case of each trade or occupation considered the facts of a more or less excessive degree of consumption frequency aside from the statistical sources of information which form the basis of the subsequent conclusions, except in the case of a few employments for which neither general vital statistics nor insurance mortality experience are as yet available. The term "tuberculosis" is used in a very general sense, and as a rule limited to phthisis pulmonalis, or consumption, unless otherwise stated. All of the references to insurance mortality experience are limited to the mortality from phthisis pulmonalis and do not include other forms of tuberculosis or other forms of respiratory diseases unless specifically stated in the text.

STATISTICAL DATA AND METHOD OF DETERMINING THE DEGREE OF CONSUMPTION FREQUENCY.

The principal statistical data used in the present discussion are, first, the occupation returns by divisional periods of life of the United States census for 1900; second, the occupation mortality statistics of the Twelfth Census, published in 1904; third, the occupation mortality statistics of Rhode Island for the decade ending with 1906; fourth, the occupation mortality statistics published decennially as a supplement to the report of the Registrar-General of Births, Marriages, and Deaths for England and Wales for the two periods 1890–1892 and 1900–1902; fifth, the corresponding statistics for Scotland; and sixth, the industrial mortality statistics of the Prudential Insurance Company of America for the decade 1897 to 1906, published in connection with the company's exhibit of the mortality from consumption in dusty trades at the International Congress on Tuberculosis, held in Washington, D. C., in 1908, and presented in a discussion of the same subject before the American Association of Medical Examiners in September, 1907, and the Medical Society of the County of New York in December, 1907.

Four different statistical methods are available to determine with approximate accuracy the degree of consumption frequency in different trades. Absolute accuracy is not obtainable in investigations of this kind, nor is it necessary for the end in view.

The first method is to determine the numbers living at ages 65 or over in different trades, and to compare the same with the corresponding proportion for occupied males generally. This method is never conclusive by itself, but is useful in conjunction with the use of other statistical data. It is evident, of course, that other factors besides mortality determine the proportion of persons at work in different occupations at ages 65 or over, and the method, therefore, requires to be used with extreme caution.

The second method is to determine the true rate of mortality from all causes, or specific causes such as consumption, by ascertaining the number of deaths occurring in every thousand persons of any particular trade or industry exposed to the risk of death for a single year. This method is by far the most satisfactory, but it is seldom that accurate information is available regarding the living population, and estimates of the numbers exposed to risk are likely to be seriously misleading. The chance of error is increased by the method employed in the Twelfth Census, since the occupation classification of the census is probably not exactly the same as the occupation classification of the different boards of health throughout the country, where the original entries are made as to the occupation of decedent at the time of death.

The third method is to determine the proportion of deaths from a specified cause, such as consumption, occurring in the mortality from all causes, without reference to ages at death. This method is made necessary in the use of the Rhode Island statistics, which are not returned by divisional periods of life. The same is true also of the occupation mortality statistics of the United States census by specified causes, but when used with extreme caution the proportions thus determined are often extremely suggestive and quite often entirely conclusive.

The fourth method is known as the proportionate mortality figure, by which the proportion of deaths from any particular disease, such as consumption, is calculated as a percentage of the deaths from all causes occurring during specified periods of life. This method has been extensively employed in the present discussion, since otherwise the available industrial insurance mortality statistics could not have been utilized. It is, in a measure, the most satisfactory and determining of all the various methods referred to, since it determines with absolute accuracy the actual incidents or degree of consumption frequency at specified periods of life.

The industrial insurance mortality statistics are derived from the experience of a large and representative company, which has from time to time given publicity to the facts of its experience. The resulting proportionate mortality returns, however, indicate a specific mortality from consumption somewhat below the actual, since the experience is, to a certain extent, affected by medical selection. In other words, the proportionate mortality from consumption, or the true actual loss from the disease at specified periods of life, would have been somewhat higher if medical selection had not been made use of. In comparing this experience with the adopted standard for the registration area of the United States the comparison is, therefore, somewhat more favorable to the various trades and occupations considered than would have been the case if the returns could have

been derived from the registration records of the different States and cities comprehending the experience of the company referred to.

The proportionate mortality figure may be briefly explained as follows: At ages 25 to 34, out of every 100 deaths from all causes in the registration area of the United States during the seven years ending 1906, 31.3 deaths were from consumption. The corresponding proportions of deaths in the industrial insurance mortality experience were 70.8 per cent for grinders, 66.7 per cent for compositors, 58.5 per cent for upholsterers, 52.9 per cent for potters, etc. The difference between the normal proportionate consumption mortality for the registration area as a whole and the corresponding proportionate mortality from consumption in the different occupations considered in detail, measure approximately the health-injurious circumstances of the different employments.

OCCUPATION CLASSIFICATION OF DUSTY TRADES.

The following occupation grouping has been adopted to emphasize the dust hazard in principal occupations and to facilitate ready reference to the various employments considered in some detail in the subsequent discussion:

Group 1.—Exposure to metallic dust:
1. Grinders.
2. Polishers.
3. Tool and instrument makers.
4. Jewelers.
5. Gold leaf manufacture.
6. Brass workers.
7. Printers.
8. Compositors.
9. Pressmen.
10. Engravers.

Group 2.—Exposure to mineral dust:
11. Stone workers.
12. Marble workers.
13. Glass blowers.
14. Glass cutters.
15. Diamond cutters.
16. Potters.
17. Cement workers.
18. Plasterers.
19. Paper hangers.
20. Molders.
21. Core makers.
22. Lithographers.

Group 3.—Exposure to vegetable fiber dust:
23. Cotton ginning.

Group 3.—Exposure to vegetable fiber dust—Concluded.
24. Cotton textile manufacture.
25. Spinners.
26. Weavers.
27. Hosiery and knitting mills.
28. Lace making.
29. Flax and linen manufacture.
30. Hemp and cordage manufacture.
31. Manufacture of jute and jute goods.
32. Paper manufacture.
33. Cabinetmakers.
34. Wood turners and carvers.

Group 4.—Exposure to animal and mixed fiber dust:
35. Furriers and taxidermists.
36. Hatters.
37. Silk manufacture.
38. Woolen and worsted manufacture.
39. Carpet and rug manufacture.
40. Shoddy manufacture.
41. Rag industry.
42. Upholsterers and hair-mattress makers.

The grouping is necessarily a more or less arbitrary one since all occupations involve exposure to more than one particular kind of

dust, but it is safe to assume that the predominating character of a particular dust exposure primarily determines the resulting departure of the consumption mortality from the normal for the general population. All the groupings of dusty trades which have been adopted by Hirt, Merkel, Arlidge, Oliver, and others have this limitation in common. Since no entirely conclusive investigation has been made to afford the material for a final and strictly scientific classification of dusty trades, the grouping adopted will serve at least the purpose of a convenient arrangement with a strict regard to the facts as they are known and understood at the present time.

OCCUPATIONS WITH EXPOSURE TO METALLIC DUST.

In the group of occupations exposing to a continuous and considerable inhalation of metallic dust resulting from industrial processes have been included for the present purpose the following representative employments: Grinders, polishers, tool and instrument makers, jewelers, gold-leaf manufacture, brass workers, printers, compositors, pressmen, and engravers. These occupations are all more or less subject to an excessive death rate from all causes, but in particular to a decided excess in the proportionate mortality from consumption, and in most cases also to a comparatively high degree of frequency in the occurrence of other respiratory diseases. The details of labor conditions, as far as they could be conveniently included in the following summary of observations regarding particular trades, appear to fully confirm the opinion that the degree of excess in consumption frequency is intimately related and in almost exact proportion to the degree of exposure to continuous and considerable inhalation of metallic dust.

GRINDERS.

The grinding trade includes a large variety of employments, of which metal grinding, by either the dry or wet process, is hygienically as well as industrially the most important. The grinding of metal involves exposure to decidedly health-injurious conditions, probably as much so if not more than in any other employment. Chiefly as the result of the inhalation of relatively large quantities of fine metallic dust, and not inconsiderable quantities of fine mineral dust, the mortality from consumption in this occupation is decidedly above the normal for occupied males generally. While the sanitary and other conditions injuriously affecting the health of metal grinders never have been so notoriously bad in the United States as in England or in continental Europe, the observed mortality of this occupation as carried on in this country fully warrants the most serious conclusions as to the health-injurious effects of this group of employments.

The mortality of metal grinders has been discussed by James H. Lloyd, M. D., in his treatise on "Diseases of occupations," included in the Twentieth Century Practice of Medicine, published in 1895. Lloyd, after calling attention to the well-known fact that the trade of the grinder is conspicuous above all others for the suffering that is entailed from the inhalation of metallic dust, describes in detail the different processes of grinding and their relation to health, from which the following is quoted:

Grinding edge tools is of two kinds—wet and dry. The latter method is by far the more injurious, as, naturally, it raises far the greater amount of dust. For some tools both methods are used—the mixed method. The tools ground are scythes, saws, table knives, machine knives, various other kinds of edge tools, files, penknives, razors, scissors, forks, needles, etc. A great difference in their bad effects is observed among the branches of the trade according as the grinders use the wet or dry method and according to the tool ground. The smaller objects are far the most trying and exacting upon health. The worst of all branches are the fork grinding and needle grinding. This is because in grinding these small objects the workman is obliged to lean close over the stone and therefore inhales large quantities of the dust, and also because the dry grinding is used.

The dust raised by grinding is composed largely of minute bits of steel. According to Hall, 12 razor blades forged in the rough, which weigh 2 pounds and 4 ounces, lose 10 ounces in the process of grinding. This loss represents so much fine metallic dust, mingled of course with dust from the stone. This statement gives some idea of the immense amount of dust produced by dry grinding. According to Holland the concrete masses of this dust formed in needle grinding have almost the specific gravity of iron.

In discussing the symptoms of the diseases typical of grinders as the result of their employment, Lloyd points out further that—

They are those of a slowly advancing bronchitis with asthma and sometimes with emphysema; later dilated bronchi with excavation are observed; then, consolidation, and breaking down of lung tissue occur as the terminal processes. The exact relationship of these processes to a tubercular infection in grinders is an interesting and important subject, which, of course, did not receive much light from the earlier writers. They endeavored, in fact, to draw distinctions between true "consumption" and grinder's "asthma," but the state of pathological knowledge in their day was not such as to permit them to do otherwise. It is quite evident from reading their reports of cases that they had to do with a disease that was essentially tubercular, but it would be interesting to have the exact relationship of this infection to the grinder's unwholesome occupation investigated by the methods of modern bacteriology. I do not know whether this has ever been done. There can be no doubt that the influence of the grinder's trade is that of a predisposing cause. The inhalation of the irritating particles of steel into the lungs causes a constant catarrhal bronchitis and pneumonitis, with increase of connective tissue; and this prepares the soil for a tubercular infection which characterizes the latter stages of the disease.

The most recent qualified discussion of the health-injurious circumstances of dry and wet grinding is by Oliver, who, in his Diseases of Occupation, goes fully into all the details concerning the trade, including a brief account of the corresponding conditions in the cutlery manufacture of Germany, at Solingen:

So far as the two methods of grinding cutlery are concerned, the dry method is, from a health point of view, the more dangerous to the workers. The dust is dry, and is in the form of a very fine powder, which readily reaches the lungs owing to the attitude of the men when at work. Steel grinders sit astride the grinding stone on a saddle, and as they lean forward keeping close to their work, they can not but inhale some of the dust, which is a mixture of steel and stone. Forks and needles are generally ground by the dry method; knives, scissors, and razors by the wet. Some are ground by both methods, e. g., the backs of razors and scissors are ground by the dry method and the remainder of the blade by the wet. It was in 1865 that Dr. T. C. Hall, of Sheffield, drew attention to the high death rate of steel grinders from pulmonary phthisis. The average age at death of steel grinders was at this period only 29 years, but of late this has improved. Doctor Hall's statistics referred to dry grinding. In wet grinding the running stone passes through a thin layer of water in a trough below the stone, so that, as its surface is always kept wet, comparatively little dust is given off during the process of grinding; but while the atmosphere is clearer of dust, the floors and walls of the workshop are damp and cold. The grinding is carried on in rooms called "hulls," which are bounded by three blank walls; the windows are without glass. Where dry grinding is carried on there are fans, but these often prove ineffective. It is no uncommon thing to find men engaged in different processes in one large room, so that the dust which is generated affects not only the workman sitting at his own grinding stone, but the other inmates of the room as well. In Sheffield it has been ascertained that in every 1,000 deaths among steel grinders pulmonary phthisis is the cause of 345 and other respiratory diseases 295; that is, collectively, pulmonary diseases account for 64 per cent of the entire mortality, whereas among the adult population of the country generally phthisis accounts for 144 deaths per 1,000 and other respiratory diseases 182, or collectively 32.6 per cent. Steel grinders die comparatively young. Dr. Sinclair White, in Dangerous Trades, page 414, says that 458 grinders in every 1,000 die between the ages of 35 and 55, compared with 261 in every 1,000 of the entire male population of the country. Only 140 grinders out of every 1,000 reach the age of 55 and upward, whereas for every 1,000 of the adult male population 391 reach 55 years and upward. Sinclair White is of the opinion that phthisis is not so rife among steel grinders as formerly. In Doctor Hall's time the average age at death from phthisis was 29 years; at present it is 43.(a)

With reference to conditions in Germany and the remarkable improvement which has followed the introduction of sanitary precau-

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[a] Diseases of Occupation, Thomas Oliver, pp. 230, 231, London, 1908.

tions, rational methods of ventilation, and other means of dust prevention, Oliver holds:

In the town of Solingen and the neighborhood it is estimated that there are 29,000 persons employed in making cutlery. Here all sorts of steel goods are made—knives, forks, scissors, and swords. A good deal of the work is done by the people in their homes, and it is interesting to know that the home industry is rather encouraged by the local authority, which provides the men with gas and electric power. So prevalent is pulmonary consumption among the grinders in Solingen that it has attracted the attention of the Government Factory Department. In the ten years 1885–1895 72.5 per cent of the deaths among knife grinders in the Solingen district was due to phthisis, against 35.3 per cent for the rest of the population over 14 years of age, and an official examination showed that out of 1,250 grinders only 85 men were over 45 years of age. Doctor Shadwell speaks approvingly of the methods adopted in some of the Solingen factories to deal with the removal of dust. Oldendorf, in writing about the grinders at Solingen, states that 24.7 per cent reached 50 years of age and 3.3 per cent 70; that at Runsched 33.8 per cent reached 50 years and 8.0 per cent 70; while at Kronenberg the numbers were 32.9 and 8.7, respectively. The mean age at death of grinders employed in the dry methods was 39.4, of workers in iron 48.3, and of the rest of the male population 54.4 years. Taking all ages, the deaths from tuberculosis per 100 cases were for grinders 78.3, iron workers 59.0, other persons 46.0.[a]

A very interesting account of the mortality of cutlery grinders in Solingen was also included in the Report of the Chief Inspector of Factories and Workshops of England for 1906, from which an abstract is made to emphasize the sanitary and labor conditions necessary to reduce the mortality of grinders to a minimum:

The atmosphere of Solingen is bright and clear. It is seldom that black smoke is seen escaping from the factory chimneys. This is largely the result of careful firing and the use of coal briquettes instead of ordinary coal, which avoids the use of slack coal. The day's actual work is nine hours; on Saturday work ceases at 5.30 p. m. The factories in Solingen are said to be marvels of order and cleanliness; the floors are of concrete and the air space for each worker must be at least 565 cubic feet. All the grinding stones are protected by guards. The walls of the workrooms are limewashed every year; the floors are swept every evening and damp-wiped once a week. The "rasing" of grindstones is never undertaken during working hours except under a stream of water or unless the stone is entirely inclosed in casing except at the working place of the rasing tool. The floors are kept clean and provision is made for the removal of the dust during grinding. Cutlery manufacture is recognized as a dangerous trade in Solingen, and in recent years considerable improvement has taken place in the means to prevent dust. In Solingen the grindstones and polishing wheels are run toward the worker; in Shef-

[a] Diseases of Occupation, Thomas Oliver, p. 232.

field they are run away from the worker, so that the dust has an upward tendency and flies into the room.[a]

The subject is also considered in the Report of the Chief Inspector of Factories and Workshops for 1907, in which the rules or police regulations governing the trade at Solingen are republished in full. A remarkable improvement in the health of the workmen has followed the introduction of these rules.

The most conclusive mortality data of metal grinders are for Sheffield, England, and from the annual reports of the medical officer of health are tabulated the deaths of grinders occurring within the period 1889 to 1906, including 2,045 deaths from all causes, of which 837 were from consumption and 543 from respiratory diseases other than consumption. The data are given in tabular form below, by divisional periods of life, with the resulting mortality from consumption and other respiratory diseases at specified ages:

PROPORTIONATE MORTALITY FROM CONSUMPTION AND FROM OTHER RESPIRATORY DISEASES COMPARED WITH THAT FROM ALL CAUSES AMONG GRINDERS, IN SHEFFIELD, ENGLAND, 1889 TO 1906, BY AGE GROUPS.

[From annual reports of the Medical Officer of Health, Sheffield, England.]

Age at death.	Deaths from all causes.	Deaths from consumption.		Deaths from respiratory diseases other than consumption.	
		Number.	Per cent.	Number.	Per cent.
Under 25 years	85	36	42.4	20	23.5
25 to 34 years	246	135	54.9	44	17.9
35 to 44 years	416	235	56.5	69	16.6
45 to 54 years	575	263	45.7	151	26.3
55 to 64 years	452	139	30.8	167	36.9
65 years or over	271	29	10.7	92	33.9
Total	2,045	837	40.9	543	26.6

According to this table, at ages under 25, of every 100 deaths from all causes, 42.4 were from consumption, increasing to 56.5 at ages 35 to 44, decreasing subsequently to 30.8 at ages 55 to 64, and to 10.7 at ages 65 or over. The corresponding mortality from respiratory diseases other than consumption was also excessive at every period of life.

There are no similar data for the United States except the industrial insurance mortality statistics of grinders, limited to 128 deaths from all causes, of which 63, or 49.2 per cent, were from consumption. Of the mortality of grinders from respiratory diseases other than consumption, 15 were from pneumonia, 5 from asthma and bronchitis, and 2 from other respiratory diseases. If the deaths from consumption and other respiratory diseases are combined, a total of 85, or 66.4 per cent of the mortality of grinders, was from diseases of

[a] Report of the Chief Inspector of Factories and Workshops, 1906, pp. 107–109.

the lungs and air passages. The excess in the mortality of grinders from consumption is clearly brought out in the tabular presentation of the proportionate mortality from this disease by divisional periods of life compared with that of all males in the registration area of the United States:(a)

PROPORTIONATE MORTALITY FROM CONSUMPTION AMONG **GRINDERS,** 1897 TO 1906, COMPARED WITH THAT OF ALL MALES IN THE REGISTRATION AREA OF THE UNITED STATES, 1900 TO 1906, BY AGE GROUPS.

[Figures for grinders from experience of an industrial insurance company; figures for males in registration area computed from mortality statistics of the United States census.]

Age at death.	Deaths of grinders, 1897 to 1906, due to—		Per cent of deaths due to consumption among—	
	All causes.	Consumption.	Grinders.	Males in registration area, 1900 to 1906.
15 to 24 years	7	4	57.1	27.8
25 to 34 years	24	17	70.8	31.3
35 to 44 years	38	24	63.2	23.6
45 to 54 years	30	12	40.0	15.0
55 to 64 years	20	5	25.0	8.1
65 years or over	9	1	11.1	2.7
Total	128	63	49.2	14.8

While according to this table the proportionate consumption mortality of grinders was excessive at all ages, the excess was most pronounced at ages 25 to 34, when out of every 100 deaths from all causes, 70.8 were from consumption, against a normal expected proportion of 31.3. The data are unfortunately very limited, but they are at present the only trustworthy source of information regarding the mortality of grinders in the United States. The number of deaths is sufficient, however, to warrant the conclusion that the mortality from consumption in this occupation is very considerably above the normal for the general population.

POLISHERS.

The polishing of metal ware is a widely diversified trade, and the term "polisher" is one of general rather than of special significance. Under the term are included metal polishers and buffers working upon steel, brass, gold, and silverware, but no data are available which would permit of a proper classification of polishers according to the metal or material manipulated. The health-injurious effects of this employment have been recognized by all who have written

[a] The registration area, from which mortality statistics were secured by the Bureau of the Census, included in 1906 about one-half (48.8 per cent) of the total estimated population of continental United States.

upon the mortality of dusty trades, and the more important facts are summarized by Arlidge in part as follows:

After being shaped and ground to the required dimensions, the next business is to burnish or polish the articles. This is accomplished by wheels covered by leather, and also by a thick bundle of linen rags cut and bound together in the form of a wheel, and which, by rapid rotation, assumes the character of a solid mass, and, at the same time, one so soft as to serve better than any other contrivance for the purpose of surface polishing. To assist in giving polish to the articles made various powders are employed; for example, emery, whiting, rouge, powdered pumice, etc. The use of these materials adds vastly to the dust of the trade and to its pernicious results; but no data are in existence to indicate what is its share in the causation of disease as compared with the dust of the grindstones. Still, no question exists that these polishing powders, differing as they do among themselves in physical qualities, differ likewise in the range of their effects upon the lungs.

The rather involved circumstances affecting the polisher's health and mortality are also discussed in The Workers of the Nation, by Mr. Gilson Willets, whose attention appears to have been attracted by the particularly health-injurious conditions of the employment, and whose conclusions are decidedly suggestive:

Metal polishers who have reached the age of 40 often look like old men. There can hardly be found a trade more deleterious to health, say those who follow it. Among the harmful conditions may be mentioned the liability of the workmen to get their lungs full of flying and impalpable dust, which is composed of metal, minerals, and cotton fiber. They are also, in many cases, deprived of the proper supply of light, and great injury to the eyes thus arises. It is not easy to wear goggles or glasses, as the operator's sight must be of the keenest in order to detect blemishes. There are laws for the protection of this class of workmen, but they are too seldom employed. New York statutes require that at each polishing lathe there shall be an exhaust fan to carry off the dust, that each operative shall have 250 square feet of air to breathe, and plenty of light. It has been claimed that not in 5 per cent of the shops do these desirable provisions prevail. A buffing wheel, making 2,500 revolutions per minute, has wrecked many constitutions. From it, as the polisher applies the metal, a cloud of dust arises, made of particles of cloth and metal, and that is what the operator breathes. Generally the windows are hermetically sealed. Often the walls and floors are covered with the accumulation of years. In the process of brightening silver-plated material there is given forth by the wheel a cloud of dust of which crocus is a large constituent, while from the plating room come fumes of nitric acid. In the process of polishing chandeliers there is much dust set free, which is composed of particles of brass, and permeates the air of the shop. Metal polishers often do not care to complain, because their wages are high. Here is a good field for activity among the factory inspectors, who should force employers to maintain proper conditions in the shops.[a]

[a] The Workers of the Nation, Vol. I, p. 57.

More recent evidence has been presented in the published sickness and mortality experience of the Metal Polishers' Union, regarding which it has been stated that:

The treasury of this union, in spite of the fact that the men are steady and have no special temptations to excess, was found to be constantly exhausted. The reason is that the death claims eat up all the funds. An investigation of these claims showed that many of the men were dying from pulmonary tuberculosis. There were some deaths from accident, a few suicides, but the rest were all from pulmonary diseases—and pneumonia was very rare as compared with phthisis. The statistics for the last four years show that in 1903, 45 metal polishers died, of whom 43 succumbed to some lung trouble. In 1904 there were but 38 deaths among the metal polishers, of which only 3 were due to other causes than pulmonary disease. In 1905 there were 70 deaths among the metal polishers, 65 of which were due to some form of lung trouble. In New York City a local union having 170 men working exclusively on the precious metals, had 8 death claims in two years, 7 being due directly to tuberculosis, while 400 men employed in all the other branches of the same industry have had but 3 deaths from this cause in the same space of time.

A medical journal, commenting upon the above-quoted facts at the time of their publication, argued very pointedly to the effect that—

It would seem from these statistics that even the cleanest kinds of dust, without a trace of infectious material in them, may still prove a source of the greatest possible danger and be the indirect cause of tuberculosis. This has been known for some time, but so startling a confirmation of it is sure to emphasize the necessity for taking every precaution for the avoidance of dust. Even what might seem to be the most innocuous of dirt particles may, when inspired, constitute foci of irritation in which tubercle bacilli may readily find a favorable nidus for implantation and growth.

There are, unfortunately, no official vital statistics of polishers except the recorded mortality for Rhode Island for the period 1897 to 1906, which, however, includes only 42 deaths of polishers from all causes, but of this number 14, or 33.3 per cent, were from consumption. There were 4 deaths from pneumonia and 2 from asthma and bronchitis, a total of 20 deaths from diseases of the lungs and air passages, or 47.6 per cent of the mortality from all causes.

The Rhode Island statistics are fully confirmed by the recorded industrial insurance mortality data of polishers, which includes 279 deaths from all causes, of which 108, or 38.7 per cent, were deaths from consumption. Of the mortality of polishers from respiratory diseases other than consumption, 25 were from pneumonia, 5 from asthma and bronchitis, and 5 from other respiratory diseases. If the deaths from consumption and other respiratory diseases are combined, it is found that 51.2 per cent of the mortality of polishers was from

diseases of the lungs and air passages. The excess in the mortality of polishers from consumption is clearly brought out in the tabular presentation of the proportionate mortality from this disease by divisional periods of life:

PROPORTIONATE MORTALITY FROM CONSUMPTION AMONG **POLISHERS**, 1897 TO 1906, COMPARED WITH THAT OF ALL MALES IN THE REGISTRATION AREA OF THE UNITED STATES, 1900 TO 1906, BY AGE GROUPS.

[Figures for polishers from experience of an industrial insurance company; figures for males in registration area computed from mortality statistics of the United States census.]

Age at death.	Deaths of polishers, 1897 to 1906, due to—		Per cent of deaths due to consumption among—	
	All causes.	Consumption.	Polishers.	Males in registration area, 1900 to 1906.
15 to 24 years	48	22	45.8	27.8
25 to 34 years	75	42	56.0	31.3
35 to 44 years	68	29	42.6	23.6
45 to 54 years	48	11	22.9	15.0
55 to 64 years	19	4	21.1	8.1
65 years or over	21	.....	.....	2.7
Total	279	108	38.7	14.8

While according to this table the proportionate consumption mortality of polishers was excessive at all ages under 65, the excess was most pronounced at ages 25 to 34, when out of every 100 deaths from all causes 56 were from consumption, against a normally expected proportion of 31.3. The number of deaths of polishers included in the analysis is sufficient to warrant the conclusion that the mortality from consumption in this occupation is very considerably above the normal for the general population, but below the corresponding averages for grinders.

TOOL AND INSTRUMENT MAKERS.

The manufacture of tools and instruments includes a large number of grinders and polishers, but it is not possible to classify the occupations in detail. In the United States census statistics the industry includes cutlery manufacture, while in English mortality statistics the group comprehends tool, file, and saw makers, cutlers and scissors makers, and needle and pin makers. The statistics of 1900 for the United States return 26,997 males of known ages 15 or over employed in this industry as previously defined, and of this number 666, or 2.5 per cent, were 65 years of age or over. The proportion attaining to old age was, therefore, somewhat larger than expected, considering the high rate of mortality of grinders and polishers, and others employed in the manufacture of tools, instruments, etc. A special investigation into the sanitary conditions of this employment was made by the Massachusetts state board of health in 1907, and the

report included a number of very valuable and suggestive references to conditions unfavorable to health and life, from which the following extracts are made:

From a sanitary point of view, the one important part of this industry is the reduction of the surface of the article in process of manufacture from the roughness of the original casting to the smoothness and brilliancy so necessary and desirable in the finished product. This involves successive treatment by wet grinding, dry grinding on emery and corundum wheels, and polishing with rouge on buffing wheels. Each of these processes, even that of wet grinding on large, coarse, and finer stones, causes to be cast into the air large amounts of fine dust, made up of very fine particles of steel and of the abrasive substance. In establishments properly equipped and conducted, provision is made to reduce the danger of this dust to a minimum by means of hoods connected with a system of exhaust fans or blowers. In spite of the precautions taken to protect their health, a very large proportion of grinders recklessly remove the hoods, and thus expose themselves unnecessarily to this especially dangerous form of dust. They assert that they prefer freedom of movement with dust to the protection afforded by hoods.

The workmen are not, as a class, long lived; indeed, the nature of the work is not compatible with longevity, and a person entering upon it in middle life is unlikely to follow it many years. Whatever the age at which the trade is taken up, a man in sound health who has followed it a few years is an acknowledged rarity. A study of the death returns of the city of Northampton, which is one of the centers of this industry, for the past twelve years, yields facts which can be interpreted in only one way. During this period tuberculosis is given as the cause of death in no less than 54.5 per cent of those whose occupation is indicated by "grinder" or "polisher," and in 45.4 per cent of those designated generally as "cutlers," and of the latter 36.4 died of pneumonia. Taken together, the "grinders," "polishers" and "cutlers" returns show that, during this period, diseases of the lungs were responsible for 72.73 per cent of their mortality. As was shown in the preliminary report on this industry, the tuberculosis death rate for cutlers in Northampton is four times as high as that for the entire adult male population.

A serious problem in the cutlery and tool industry is how to secure effective ventilation, and many of the factories and workshops inspected were found to be seriously defective in this respect. A large proportion of the workmen, including many young boys, are exposed to considerable dust, chiefly, of course, in the grinding and polishing departments. While much has been done to improve the sanitary conditions by artificial ventilation, there has been but a very languid cooperation on the part of the operatives themselves, and many, in fact, are interfering with the arrangements made for their protection to the extent of removing the hoods and exhaust pipes installed for the purpose of removing the dust.

The United States census vital statistics do not include the mortality of tool and instrument makers, and the only official statistics are

those of the state board of health of Rhode Island. During the decade 1897 to 1906 there were recorded in Rhode Island 44 deaths of tool makers from all causes, and of this number 9, or 20.5 per cent, were from consumption, and 5, or 11.4 per cent, from other respiratory diseases. The total mortality from diseases of the lungs and air passages was 14, or 31.9 per cent, against an expected percentage of 30.3 for all occupied males in Rhode Island. Fortunately there are more conclusive data regarding this occupation. The most valuable official statistics are those for England and Wales, published at decennial intervals in the supplements to the reports of the registrar-general of births, marriages, and deaths. Only two comparatively recent investigations are here referred to. The first of these, for the three years ending with 1892, included 2,529 deaths from all causes, of which 505, or 20 per cent, were from consumption. Of diseases of the respiratory system other than consumption, 384 deaths were from bronchitis, 286 from pneumonia, and 78 from other diseases of this group, a total of 748, or 29.6 per cent, of the mortality from all causes. Combining the mortality from consumption and other respiratory diseases, it is found that 49.5 per cent of the deaths of tool and instrument makers, as previously defined, were from diseases of the lungs and air passages.

The most recent English mortality statistics of tool and cutlery manufacture are for the three years ending with 1902, referred to in the Supplement to the Sixty-fifth Annual Report of the Registrar-General, in part as follows:

In the occupation as a whole the mortality at ages under 25 is below the standard for occupied and retired males; but among file makers the death rate at these ages exceeds the standard. Beyond age 25 the mortality in the whole occupation, as well as among cutlers and file makers, considerably exceeds the standard. At ages 45 to 65 years the death rate among cutlers is 72 per cent and that of file makers is 84 per cent above the average. Within the main working period of life the comparative mortality figure for the whole occupation is 1,315, or 31 per cent, above the standard. The mortality from lead poisoning is nine times and that from phthisis is nearly double the standard, and these workers suffer excessively from nervous, circulatory, respiratory, and urinary diseases. On the other hand, the mortality from alcoholism and liver disease and from accident is about half the average. Among cutlers and file makers the comparative mortality figures considerably exceed the average for the entire occupation, the figure for the former being 56 per cent above the standard for all occupied and retired males, while that for the latter is 69 per cent in excess. Indeed, these two occupations appear to be the most unhealthy in the whole group of workers in metal. It should be mentioned in this place that the occupation of file maker is one that is specially liable to lead poisoning, the mortality figure for plumbism being no less than 56, whilst among all occupied and retired males the mortality is represented by unity.

File makers experience more than twice the average mortality from nervous diseases and nearly four times the average from Bright's disease, but cutlers experience comparatively little excess of mortality from either of these causes. In both industries the mortality from phthisis is enormous, the figure for cutlers being nearly three times and that for file makers more than twice the standard, and in both occupations the mortality from respiratory diseases approaches double the standard. Both these workers, however, experience a low mortality from influenza, from alcoholism and liver disease, and from accident, while among file makers the mortality from cancer is also less than normal.(a)

The English occupation mortality statistics for men employed at tool, instrument, and cutlery making are quite conclusive of the more or less unfavorable effects of this industry on health. In the table which follows a comparison is made of the mortality from all causes among men in this group with occupied males generally, and the result is decidedly suggestive of conditions in this trade more or less unfavorable to life and health, but in particular at ages 45 or over, when the general mortality of this class exceeds the general average by from 8.24 to 12.26 per 1,000.

MORTALITY FROM ALL CAUSES AMONG **TOOL, INSTRUMENT, AND CUTLERY MAKERS,** COMPARED WITH THAT OF ALL OCCUPIED MALES IN ENGLAND AND WALES, 1900 TO 1902, BY AGE GROUPS.

[From Part II, Supplement to the Sixty-fifth Annual Report of the Registrar-General of Births, Deaths, and Marriages in England and Wales.]

Age at death.	Death rate per 1,000 for all occupied males.	Death rate for tool, instrument, and cutlery makers.		
		Rate per 1,000.	Greater (+) or less (−) than rate for all occupied males.	Ratio to rate for all occupied males.
15 to 19 years	2.44	2.09	− 0.35	86
20 to 24 years	4.41	3.32	− 1.09	75
25 to 34 years	6.01	6.32	+ .31	105
35 to 44 years	10.22	13.65	+ 3.43	134
45 to 54 years	17.73	25.97	+ 8.24	146
55 to 64 years	31.01	42.05	+11.04	136
65 years or over	88.39	100.65	+12.26	114

The preceding table is self-explanatory and requires no further comment. A more extended comparison is made in the next table, in which the mortality of tool, instrument, and cutlery makers from consumption and other respiratory diseases is compared with the normal mortality of occupied males from these diseases, by divisional periods of life. The comparison shows that at ages 20 or over the mortality

(a) Part II, Supplement to the Sixty-fifth Annual Report of the Registrar-General of Births, Deaths, and Marriages in England and Wales, pp. lxix, lxx.

from consumption is excessive among tool, instrument, and cutlery makers, but decidedly so at ages 35 to 64, inclusive. The table further shows that the mortality from other respiratory diseases is excessive among men in this class, but decidedly so at ages 45 or over, reaching the highest rate at ages 65 or over, when the excess is 7.69 per 1,000. The two tables, derived from English experience, fully confirm the previous conclusion that the mortality of tool, instrument, and cutlery makers is excessive when comparison is made with the normal mortality of occupied males generally and that this excess is largely because of a high degree of consumption frequency, particularly at ages 25 to 64, when the excess is from 0.91 to 4.09 per 1,000. The table which follows requires no further comment and is otherwise self-explanatory:

MORTALITY FROM CONSUMPTION AND FROM OTHER DISEASES OF THE RESPIRATORY SYSTEM AMONG **TOOL, INSTRUMENT, AND CUTLERY MAKERS,** COMPARED WITH THAT OF ALL OCCUPIED MALES IN ENGLAND AND WALES, 1900 TO 1902, BY AGE GROUPS.

[From Part II, Supplement to the Sixty-fifth Annual Report of the Registrar-General of Births, Deaths, and Marriages in England and Wales.]

Age at death.	Mortality from consumption.				Mortality from other diseases of the respiratory system.			
	Death rate per 1,000 for all occupied males.	Death rate for tool, instrument, and cutlery makers.			Death rate per 1,000 for all occupied males.	Death rate for tool, instrument, and cutlery makers.		
		Rate per 1,000.	Greater (+) or less (−) than rate for all occupied males.	Ratio to rate for all occupied males.		Rate per 1,000.	Greater (+) or less (−) than rate for all occupied males.	Ratio to rate for all occupied males.
15 to 19 years.....	0.54	0.17	−0.37	31	0.24	0.23	−0.01	96
20 to 24 years.....	1.55	1.57	+ .02	101	.48	.56	+ .08	117
25 to 34 years.....	2.03	2.94	+ .91	145	.77	1.14	+ .37	148
35 to 44 years.....	2.74	5.90	+3.16	215	1.66	2.01	+ .35	121
45 to 54 years.....	3.04	7.13	+4.09	235	3.32	5.40	+2.08	163
55 to 64 years.....	2.16	5.26	+3.10	244	6.54	10.42	+3.88	159
65 years or over...	1.11	1.97	+ .86	177	17.77	25.46	+7.69	143

The recorded industrial insurance mortality statistics of tool and instrument makers include 303 deaths from all causes, of which 101, or 33.3 per cent, were from consumption. Of the mortality of tool and instrument makers from other respiratory diseases, 25 were from pneumonia, 9 from asthma and bronchitis, and 5 from less frequent respiratory diseases. If the deaths from consumption and other respiratory diseases are combined, it is found that 46.3 per cent of the mortality of tool and instrument makers was from diseases of the lungs and air passages. The excess in the consumption mortality of tool and instrument makers is still more clearly brought out in the tabular presentation of the proportionate mortality from this disease by divisional periods of life. While the consumption mortality of

tool and instrument makers was excessive at all ages, the excess was most pronounced at 25 to 34, when out of every 100 deaths from all causes 59.3 were from consumption, against a normal expected proportion of 31.3. The analysis of the consumption mortality of tool and instrument makers in detail is set forth in the table below:

PROPORTIONATE MORTALITY FROM CONSUMPTION AMONG **TOOL AND INSTRUMENT MAKERS,** 1897 TO 1906, COMPARED WITH THAT OF ALL MALES IN THE REGISTRATION AREA OF THE UNITED STATES, 1900 TO 1906, BY AGE GROUPS.

[Figures for tool and instrument makers from experience of an industrial insurance company; figures for males in registration area computed from mortality statistics of the United States census.]

Age at death.	Deaths of tool and instrument makers, 1897 to 1906, due to—		Per cent of deaths due to consumption among—	
	All causes.	Consumption.	Tool and instrument makers.	Males in registration area, 1900 to 1906.
15 to 24 years	40	13	32.5	27.8
25 to 34 years	59	35	59.3	31.3
35 to 44 years	68	24	35.3	23.6
45 to 54 years	56	21	37.5	15.0
55 to 64 years	32	4	12.5	8.1
65 years or over	48	4	8.3	2.7
Total	303	101	33.3	14.8

The preceding observations and statistical data fully confirm the conclusion that tool and instrument makers, including under this term many similar employments, but in particular the manufacture of cutlery inclusive of grinding and polishing, represent a trade subject to decidedly health-injurious circumstances which are responsible for the comparatively high degree of consumption frequency disclosed by both the general vital statistics of the occupation and the observed mortality of this class in industrial insurance experience.

JEWELERS.

The manufacture of jewelry in all its branches involves a large variety of manipulations, including the melting and refining of small quantities of the precious metals, and the handling, shaping, cutting, and polishing of precious stones. An important part of the industry is engraving and die cutting, which, however, for the present purpose, is separately considered as a well-defined occupation, and although often included with jewelers, it is equally often included with printers and compositors. Most of the articles made by jewelers are of small dimensions, such as chains, rings, brooches, pins, and buckles, which require painstaking care in handling and continuous eye-straining attention in shaping and polishing. Aside from the

use of gold and silver, many other metals and mineral substances are employed, such as jet, coral, tortoise, bone, ivory, etc. Zinc is also extensively used as an alloy and for coloring purposes. The gems require to be cut with extreme care, and the work of the diamond polisher and lapidary constitutes, next to the gold and silver smith, important separate branches of the trade. The manufacture of artificial gems, made of a paste, chiefly of a vitreous substance prepared from rocks and crystals or flint powder, subsequently treated with nitric acid with lead and borax as a flux, forms another important subdivision of the industry.

The work of the jeweler is naturally an indoor occupation, involving a stooping position, much like that of the engraver. The workshops are generally small and the ventilation is usually poor. The dust generated in the process of hammering, cutting, shaping, grinding, polishing, etc., is considerable, but very minute, and not easily observed. The dust accumulations are preserved and sold to refining plants, for remelting and the recovery of precious substances. The health problem is complicated by the universal use of blow-pipe apparatus and of gas for heating purposes. In large factories the use of machinery is increasing, but chiefly in connection with the manufacture of imitation jewelry and stones.

The unhygienic condition of many jewelry workshops and the general effect of this employment on health were discussed at some length in an early treatise by Thackrah, from which is quoted the following:

> The jewelers' workrooms are generally crowded, and the atmosphere consequently fouled by respiration, animal effluvia, and the smoke of lamps, as well as by the specific exhalations of the manufacture. Its temperature is generally raised, and in summer the heat is excessive. The labor is light, but the confinement to a leaning posture, with the head much depressed, and the elbows generally fixed to the sides of the trunk, for ten, fourteen, or sixteen hours a day, is irksome and injurious. Intemperance is general, and dram drinking especially prevalent. The disorders of which jewelers principally complain are pains and soreness of the chest, disorders of the stomach and liver, and plethoric affections of the head. They enter the employ about 13 or 14 years of age and are obliged to abandon it generally at 45 to 50.[a]

Thackrah continues that "an old jeweler is seldom to be found, and leaving work, they seem to leave the world as well." That this rather unfavorable view regarding the health conditions in the jewelers' trade is not exaggerated is made evident by the fairly trustworthy vital statistics of the trade. The English mortality data of jewelers and allied occupations for the three years ending with 1902, include 2,823 deaths from all causes, of which 598, or 21.2 per cent, were from

[a] Effects of Arts, Trades, and Professions on Health and Longevity. C. Turner Thackrah, London, 1832, p. 115.

consumption. In addition to a high mortality from consumption there were 164 deaths from bronchitis and 247 from other respiratory diseases, a total of 1,009 deaths, or 35.7 per cent, from diseases of the lungs and air passages in the mortality from all causes.(a)

In Rhode Island the jewelry industry has attained to very large proportions, constituting one of the most important industries in that State. During the ten years ending with 1906 the number of deaths of jewelers recorded was 557 from all causes, and of this number 173, or 31.1 per cent, were from consumption, and 51, or 9.2 per cent, from other respiratory diseases; of the total mortality, therefore, 224 deaths, or 40.3 per cent, were from diseases of the lungs and air passages. No corresponding information is available for other States, but in Massachusetts an investigation was made in 1907 into the hygiene of this trade under the direction of the state board of health, the results of which, however, were rather inconclusive. The opinion arrived at regarding the relation of this employment to health was a rather favorable one, it being stated that in general the appearance of the employee "is healthy and many who have followed the industry for twenty or more years speak of the work as being entirely consistent with good health." This favorable opinion, however, may be called into question in view of the very high proportionate mortality from consumption among jewelers and others employed in the jewelers' trade. In amplification of the previous reference to the Rhode Island statistics, it may be stated that during the half century ending with 1902, 1,252 deaths of jewelers were recorded, of which 480, or 38.3 per cent, were from consumption. There were also 80 deaths from pneumonia, 18 from asthma and bronchitis, or a total of 578 deaths, or 46.2 per cent, from diseases of the lungs and air passages in the mortality from all causes.

The recorded mortality of jewelers in industrial insurance experience includes 403 deaths from all causes, of which 113, or 28 per cent, were from consumption. Of the mortality of jewelers from other respiratory diseases, 37 were from pneumonia, 10 from asthma and bronchitis, and 2 from other respiratory diseases. The deaths from consumption and other respiratory diseases combined show that 40.2 per cent of the mortality of jewelers was from diseases of the lungs and air passages. The excess in the consumption mortality of jewelers is still more clearly brought out in the tabular presentation of the proportionate mortality from this disease by divisional periods of life. While the consumption mortality of jewelers was excessive at all ages, the excess was most pronounced at 25 to 34, when out of every

(a) The English data include watch and clock makers, makers of scientific instruments, and other more or less closely allied trades. For this reason the English statistics are not strictly comparable with other data for jewelers and are, not, therefore, presented here in tabular form.

100 deaths from all causes 59.5 were from consumption, against a normal expected proportion of 31.3. The analysis of the consumption mortality of jewelers in detail is set forth in the following table:

PROPORTIONATE MORTALITY FROM CONSUMPTION AMONG **JEWELERS**, 1897 TO 1906, COMPARED WITH THAT OF ALL MALES IN THE REGISTRATION AREA OF THE UNITED STATES, 1900 TO 1906, BY AGE GROUPS.

[Figures for jewelers from experience of an industrial insurance company; figures for males in registration area computed from mortality statistics of the United States census.]

Age at death.	Deaths of jewelers, 1897 to 1906, due to—		Per cent of deaths due to consumption among—	
	All causes.	Consumption.	Jewelers.	Males in registration area, 1900 to 1906
15 to 24 years	60	24	40.0	27.8
25 to 34 years	74	44	59.5	31.3
35 to 44 years	50	22	44.0	23.6
45 to 54 years	59	13	22.0	15.0
55 to 64 years	77	7	9.1	8.1
65 years or over	83	3	3.6	2.7
Total	403	113	28.0	14.8

The preceding observations and statistical data confirm the conclusion that jewelers as a class are subject to an excessive mortality from consumption, but in particular at ages 25 to 34, and that this excess is in a large measure the result of health-injurious circumstances connected with the employment.

MANUFACTURE OF GOLD LEAF.

The work of the gold leaf beater is nearly all hand work, excepting in the operation of the rolling machines. The trade is carried on to-day in practically the same manner as in ancient times. The weight of the hammer used will average 18 pounds, which is more than that of the hammer used by the average blacksmith. Girls, as a rule, are employed in connection with the less arduous operations and the final packing of the gold leaves in boxes and packages. The tissue used in connection with this process is coated with red chalk, the dust of which, of course, enters into the atmosphere of the rooms, usually badly ventilated. One of the chief difficulties in connection with ventilation is the fact that the slightest draft of air will carry the scrap of gold leaf from one anvil to another and make packing operations difficult or impossible. Evidence that the fine particles of gold enter the atmosphere is found in the fact that workmen with beards turn in less waste gold than clean-shaven workmen, and they are now required to wash themselves before leaving the shop, the water being filtered for the recovery of the metal contained therein.

Thackrah, writing in 1832, held that gold-beating must be considered a distinct employment, aside from the metal trade generally. Gold-beaters are about half the day engaged in beating the metal with heavy hammers and the rest in spreading the gold leaf on paper. By this change in employment the process affords an excellent alternation of labor and comparative rest. In his opinion, the men were not exposed to health-injurious conditions and were generally healthy and robust.(a) It is difficult, however, to accept these conclusions in their entirety. The work of the gold-beater is carried on in rooms the air of which is more or less contaminated and where proper provision for ventilation is extremely difficult, if not impossible. The work is commenced at rather early ages and quite a considerable proportion of young persons are employed. Whether gold dust is itself injurious has never been scientifically determined, but it is quite probable that it is less injurious than other metallic dust.

There are no general vital statistics for this occupation other than the published industrial insurance mortality experience data and these are limited to only 25 deaths from all causes. Of this number 7 were from consumption and 5 from pneumonia and other respiratory diseases. For all ages 28 per cent of the deaths were from consumption, and at 25 to 34 the proportionate mortality from this disease was 50 per cent. The very limited number of observed cases does not warrant a final conclusion, but the statistical evidence would seem to confirm the view that the consumption mortality in this occupation is above the average. The sanitary problems in this industry are complicated by the fact that the work is, as a rule, carried on in small shops, to which it is most difficult to apply rational principles of factory legislation.

BRASS WORKERS.

Brass workers, exclusive of brass polishers and buffers, who have been separately considered, constitute a large group of widely diversified and often quite unlike employments. Brass casting, founding, and molding are arduous occupations exposing to the inhalation of considerable quantities of mineral dust more or less mixed with metallic ingredients. Whether brass dust, as such, is more injurious than the dust of iron and steel, for illustration, has not been determined. In the evidence submitted to the Departmental Committee on Compensation for Industrial Diseases by the National Society of Amalgamated Brass Workers,(b) including about 7,000 members, it was

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[a] Effects of Arts, Trades, and Professions on Health and Longevity, by C. Turner Thackrah, 1832, p. 48.

[b] Minutes of Evidence, Departmental Committee on Compensation for Industrial Diseases, 1906, p. 75 et seq.

stated that about 2,000 of these were engaged in casting. The trade was said to be divided into pattern making, chasing, casting, finishing, burnishing, polishing, and putting together. The corresponding classification of the trade in the United States follows practically similar lines.(a) Of the groups mentioned, casting and founding were considered the most injurious to health. Burnishing was held to be less injurious than polishing, but the so-called putting together was stated to be decidedly unhealthful on account of the use of white lead. Evidently, in so diversified a trade the degree of dust exposure must vary widely, and at best the degree of injury can only be measured approximately upon the basis of more or less indefinite mortality data. The exposure of brass workers to dust inhalation is only one of a number of specific factors in the trade decidedly injurious to health and life, and of these mention may be made of the exposure to fumes and vapors generated in the smelting processes. Brass founder's ague is a well-defined occupation disease, the symptoms of which are tightness of the chest with indefinite nervous sensation, followed by fever and previous sweating. Zinc and other fumes inhaled are the chief causes of this ailment, and it is quite probable that the lung injury resulting from the inhalation of fine particles of metallic dust is a material contributory cause in brass founder's ague. Arlidge, in summing up the views of other authorities on brass workers' disease, points out that—

> Besides brass founding, there are other departments in the brass-working business that are damaging to health; and chiefly so by reason of the dust produced. These branches are brass casting, turning, filing, and polishing. The soft nature of brass is opposed to the development of very fine and acuminated particles, and its weight to its rising very freely and to its diffusion in the air. Nevertheless, those turning and filing it show clearly, by their clothes and hair, that it is largely dispersed; the latter getting green, as happens with brass founders. The inhalation of brass dust operates in similar fashion to that seen in connection with other metallic dusts, provoking bronchial catarrh, which advances to bronchitis and ends in fibrosis. It is reported by some writers that phthisis is unusually prevalent, but no reliable statistics are available to support this statement.

More recent investigations in England fully confirm these earlier conclusions. In 1894 a departmental committee was appointed by the secretary of state to report upon the conditions of work as affecting the health of operatives in the manufacture of brass and kindred amalgams. In its report, which was published in 1896, the committee stated as the result of its investigation, first, that brass workers as a class were extensively liable to diseases of the respiratory or-

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[a] The number of brass workers in the United States in 1900 was 26,760, but of this number 890 were women.

gans, and, second, that brass founder's ague, so called, was found to result from the inhalation of fumes given off by the molten brass at the time of pouring, but in a less degree it was attributed to the contamination of the workers' food by the fumes, and that this danger was in proportion to the amount of zinc used in the alloy. The subject was also reported upon in much detail in the Report of the Chief Inspector of Factories and Workshops for the year 1905. From this report the following suggestive extracts are made:

Altogether some 500 brass workers were examined, and in addition to the filling in by each one of them of the appended form, note was made of the height, weight, chest measurement, and strength of grasp; the heart, lungs, gums, and teeth were, whenever practicable, examined, and the condition as to anemia, paresis, general health, and prevalence of brass founder's ague was determined.

The result of the replies of 216 casters and 199 polishers and others to the question, Do you consider that your health has been in any way injured by working in brass? was that 22.7 per cent of the casters and 11.6 per cent of the polishers and others said they had suffered. This is perhaps the strongest evidence obtained in the inquiry that the casters are exposed to more trying conditions of work than are other brass workers.

The nature of the injury was, as a rule, only very vaguely expressed; in the case of the casters it was nearly always either "fumes" or "sulphur," and in that of the polishers "dust." In one casting shop, where 19 strip casters were examined, of whom 9 said they suffered, illness or discomfort was attributed in some cases to resin fumes in addition to those ordinarily present. Among the casters there were indications that the older the workers were, and also that the earlier the age of commencement of work, the more did they say they had suffered, facts which could not be observed in the case of the polishers.

In 8 casters (3.9 per cent) definite physical signs in the lungs were found, and similarly in 3 (1.5 per cent) of the polishers and others. In two of the casters these pointed to chronic phthisis, while the remainder pointed to bronchial catarrh. I am not inclined to draw any conclusions from these facts, because (1) the number of observations is too small, (2) the examination in some of the factories was carried out under great disadvantages, owing to the impossibility of securing a quiet room, and (3) it is well known that persons who are the subjects of disease of the lungs in any marked degree are not likely to be found at work.

Very strong evidence of the beneficial effect of good exhaust ventilation in connection with all kinds of polishing operations, and indirectly of the lowered state of health from the nonremoval of the dust, was obtained at one factory. Here the opinion of the occupier was that the installation had paid for itself over and over again in the better work which was turned out by the men, and by the improved tone among them resulting from the absence of the obnoxious dust. The remarks of the polishers bore this out. One said, "Worked for eighteen years before the fan was put in, when the dust used to

make him feel sick, but it is not so now." A second said, "I prefer this shop to any other." A third, "I never worked in a cleaner shop;" and a fourth, "The fan is a great improvement."

A large amount of fluff, sand, and lime is given off in the process of polishing with calico mops. It is not, therefore, difficult to understand (even although actual injury to health from it may be hard to prove) that removal of the dust is welcomed as tending to make the work healthier. A sample of dust taken from under a polishing bob was submitted to Doctor Thorpe, who reported: "This sample contains a large proportion of fiber, the loss on ignition amounting to 37.6 per cent. The metallic portion of the residue—copper, zinc, lead, and iron—amounts to 10.56 per cent of the total sample. The lead present equals 0.22 per cent of the total sample, or 2.1 per cent of the above metallic constituents, or, excluding the iron, 2.33 per cent. Microscopically brass dust collected from near an emery wheel showed all the appearances of an injurious metallic dust—fine particles with irregular jagged edges."

Oliver concludes his observations regarding the hygiene of this employment with the following statement:

The necessity of personal cleanliness on the part of workmen and of well-ventilated workshops is apparent. Means ought to be provided for a ready escape of the fumes and for the removal of dust. The workshops ought to be cleaned at least once a year and the walls whitewashed. Hot and cold water should be provided for the men to wash in. The workmen themselves have found out by experience that milk is both a prophylactic or preventive as well as a curative agent. While the use of respirators seems called for, the men can not work well in them. Women and persons under 18 years of age are not allowed to work in the casting shop.

The most recent English mortality statistics of brass workers are for the three years ending with 1902, referred to in the report of the registrar-general in part, as follows:

The mortality of these workers is somewhat below the standard at ages 15 to 20 and 25 to 35 years, but above the standard at every other age group. In the main working period of life their comparative mortality figure is 1,154, or 15 per cent above the average; the greatest excess of mortality occurring under the head of phthisis, the figure for which disease is above the average by 45 per cent. The mortality from diseases of the nervous, circulatory, respiratory, and urinary systems as well as from suicide is also above the average. These workers are only slightly liable to fatal influenza, and their mortality from alcoholism and liver disease is also low. They likewise suffer less than the average from fatal accident.(a)

The English occupation mortality statistics for brass workers are quite conclusive of the more or less unfavorable effects of this industry on health. In the table which follows a comparison is made of

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a Part II, Supplement to the Sixty-fifth Annual Report of the Registrar-General of Births, Deaths, and Marriages in England and Wales, p. lxxv.

the mortality from all causes of men in this group with occupied males generally, and the result is quite suggestive of conditions in this trade more or less unfavorable to life and health, but in particular at ages 35 to 64, when the general mortality of this class exceeds the general average by from 3.17 to 5.59 per 1,000.

MORTALITY FROM ALL CAUSES OF **BRASS WORKERS**, COMPARED WITH THAT OF ALL OCCUPIED MALES IN ENGLAND AND WALES, 1900 TO 1902, BY AGE GROUPS.

[From Part II, Supplement to the Sixty-fifth Annual Report of the Registrar-General of Births, Deaths, and Marriages in England and Wales.]

Age at death.	Death rate per 1,000 for all occupied males.	Death rate for brass workers.		
		Rate per 1,000.	Greater(+) or less (−) than rate for all occupied males.	Ratio to rate for all occupied males.
15 to 19 years	2.44	2.22	−0.22	91
20 to 24 years	4.41	5.13	+ .72	116
25 to 34 years	6.01	5.86	− .15	98
35 to 44 years	10.22	12.79	+2.57	125
45 to 54 years	17.73	20.90	+3.17	118
55 to 64 years	31.01	36.60	+5.59	118
65 years or over	88.39	83.78	−4.61	95

The preceding table is self-explanatory and requires no further comment. A more extended comparison is made in the next table, in which the mortality of brass workers from consumption and respiratory diseases other than consumption is compared with the normal mortality of occupied males from these diseases, by divisional periods of life. The comparison shows that at ages 20 to 64, inclusive, the mortality of brass workers from consumption is excessive by from 0.42 to 1.79 per 1,000, the excess being greatest at ages 35 to 44. The table further shows that the mortality from respiratory diseases other than consumption is excessive among men in this class, but decidedly so at ages 55 and over, when the excess is from 1.29 to 2.88 per 1,000. The two tables derived from English experience fully confirm the previous conclusion that the mortality of brass workers is excessive when comparison is made with the normal mortality of occupied males generally, and that this excess is largely because of the high degree of consumption frequency, particularly at ages 25 to 54. The table which follows requires no further comment, and is otherwise self-explanatory.

MORTALITY FROM CONSUMPTION AND FROM OTHER DISEASES OF THE RESPIRATORY SYSTEM AMONG **BRASS WORKERS,** COMPARED WITH THAT OF ALL OCCUPIED MALES IN ENGLAND AND WALES, 1900 TO 1902, BY AGE GROUPS.

[From Part II, Supplement to the Sixty-fifth Annual Report of the Registrar-General of Births, Deaths, and Marriages in England and Wales.]

Age at death.	Mortality from consumption.				Mortality from other diseases of the respiratory system.			
	Death rate per 1,000 for all occupied males.	Death rate for brass workers.			Death rate per 1,000 for all occupied. males.	Death rate for brass workers.		
		Rate per 1,000.	Greater (+) or less (−) than rate for all occupied males.	Ratio to rate for all occupied males.		Rate per 1,000.	Greater (+) or less (−) than rate for all occupied males.	Ratio to rate for all occupied males.
15 to 19 years.....	0.54	0.49	−0.05	91	0.24	0.24	.....	100
20 to 24 years.....	1.55	2.17	+ .62	140	.48	.52	+0.04	108
25 to 34 years.....	2.03	2.93	+ .90	144	.77	.60	− .17	78
35 to 44 years.....	2.74	4.53	+1.79	165	1.66	2.05	+ .39	123
45 to 54 years.....	3.04	4.61	+1.57	152	3.32	3.94	+ .62	119
55 to 64 years.....	2.16	2.58	+ .42	119	6.54	9.42	+2.88	144
65 years or over...	1.11	.44	− .67	40	17.77	19.06	+1.29	107

The recorded mortality of brass workers in industrial insurance experience includes 414 deaths from all causes, of which 161, or 38.9 per cent, were from consumption. Of the mortality of brass workers from respiratory diseases, other than consumption, 36 were from pneumonia, 3 from asthma and bronchitis, and 12 from less frequent respiratory diseases. If the deaths from consumption and other respiratory diseases are combined, 51.2 per cent of the mortality of brass workers was from diseases of the lungs and air passages. The excess in the consumption mortality of brass workers is still more clearly brought out in the tabular presentation of the proportionate mortality from this disease by divisional periods of life. While the consumption mortality was excessive at all ages, the excess was most pronounced at ages 15 to 24, when out of every 100 deaths from all causes 59.1 were from consumption, against a normal expected proportion of 27.8. The analysis of the consumption mortality of brass workers in detail is set forth in the following table.

PROPORTIONATE MORTALITY FROM CONSUMPTION AMONG **BRASS WORKERS**, 1897 TO 1906, COMPARED WITH THAT OF ALL MALES IN THE REGISTRATION AREA OF THE UNITED STATES, 1900 TO 1906, BY AGE GROUPS.

[Figures for brass workers from experience of an industrial insurance company; figures for males in the registration area computed from mortality statistics of the United States census.]

Age at death.	Deaths of brass workers, 1897 to 1906, due to—		Per cent of deaths due to consumption among—	
	All causes.	Consumption.	Brass workers.	Males in registration area, 1900 to 1906.
15 to 24 years	66	39	59.1	27.8
25 to 34 years	112	56	50.0	31.3
35 to 44 years	91	41	45.1	23.6
45 to 54 years	58	14	24.1	15.0
55 to 64 years	54	11	20.4	8.1
65 years or over	33	.....	.....	2.7
Total	414	161	38.9	14.8

The preceding observations and statistical data fully confirm the conclusion that brass workers as a class are subject to decidedly health-injurious circumstances connected with the employment, and resulting in a comparatively high degree of consumption frequency and a death rate from respiratory diseases in excess of the normal at ages 35 or over.

PRINTERS.

The employment of printers differs in many essentials from most of the other occupations considered in this discussion, since it is homogeneous and well-defined and common throughout the country. While in many of the modern printing establishments the conditions favoring health and life, with special reference to ventilation and light, are probably satisfactory, in the smaller workshops the sanitary conditions, as a rule, are decidedly to the contrary, and predispose to tuberculosis. Thackrah early called attention to the diseases of printers, and in his opinion "few appear to enjoy good health." Consumption, according to this writer, was frequent, but apparently caused rather by the confinement or indoor employment than from direct injury to the respiratory organs. The trade is one which has received a considerable amount of attention because of its recognized unhygienic features, and, in addition to the general data upon this subject, the mortality experience of various typographic associations has been carefully investigated. As Oliver points out, "Printing houses should be so constructed that free currents of air can get to them, and not, as is so frequently the case, shut in by other buildings."

But such construction is even to-day the exception rather than the rule. Considering that, as a class, printers probably rank above the average mechanics in intelligence and earnings, it is difficult to un-

derstand why they should so persistently in the past have neglected the important problem of workshop hygiene. The successful effort to secure to the members of the craft in illness or old age a home in the mountain region of the West emphasizes what could be done by concentrated effort in other and even more important directions. In the historical sketch of the Union Printers' Home, at Colorado Springs, it is, in fact, pointed out that the place was selected for the location of the home primarily because of the special liability of printers to all forms of lung and throat diseases, and in explanation of the subsequent necessity for a hospital annex the statement is repeated that "consumption is one of the diseases to which the printer is especially liable."

The English vital statistics of printers for 1890 to 1892 are quite conclusive. Out of 2,677 deaths of printers from all causes, 917 were from phthisis, 218 from bronchitis, 186 from pneumonia, and 50 from other diseases of the respiratory system. In every 100 deaths from all causes there occurred, therefore, 51.2 deaths from diseases of the lungs and air passages. In comparing the mortality rates of printers with occupied males generally the health-injurious effects of the occupation, at even very early ages, become very readily apparent. At ages 15 to 19 the rate for occupied males generally was 2.55 against 3.24 for printers; at 20 to 24 the rates were, respectively, 5.07 and 6.61; at 25 to 34, 7.29 and 9.10; at 35 to 44, 12.43 and 14.40; at 45 to 54, 20.66 and 21.56; at 55 to 64, 36.66 and 43.39; and finally, at ages 65 or over, 102.32 and 102.61. This comparison proves conclusively that the excess in the mortality falls very largely upon ages under 35, and at these ages more than half of the mortality from all causes is from diseases of the lungs or air passages, or primarily from consumption.

Tatham, in commenting upon the excessive mortality of printers, as disclosed by an analysis of the English mortality data, remarks that "like bookbinders, printers die very rapidly from phthisis, and probably for a similar reason, namely, because of the excessively unhealthful conditions under which their work is carried on."[a] Tatham calls attention, however, to the decline in the mortality of printers during the course of the last twenty years, due among other causes to the decrease in the deaths from lead poisoning, which had fallen to one-half of the earlier figure. The frequency of phthisis among English printers had decreased during the decade by one-sixth of the former rate.

In the occupation mortality statistics of the Twelfth Census, printers are grouped with compositors and pressmen, which is to be regretted since there are certain important differences in the disease liability of

[a] Dangerous Trades, p. 151.

these allied employments which are sufficiently distinct to warrant separate consideration, at least in the case of pressmen, although the number of the latter is comparatively small. The total number of persons included in this group in the registration States, aged 15 or over, according to the census, was 54,374, but of this number only 818, or 1.5 per cent, had attained to the age of 65 or over.(a) This rather surprising result is confirmed by the statistics of the New Jersey bureau of labor for 1891, according to which out of 462 printers only 2 had attained to the age of 60 or over. The census mortality statistics of this group of printers, or as stated, compositors, printers, and pressmen, are of some value though not entirely conclusive on account of probable defects in the census enumeration.

MORTALITY FROM ALL CAUSES AMONG **COMPOSITORS, PRINTERS, AND PRESSMEN,** COMPARED WITH THAT OF THE MANUFACTURING AND MECHANICAL CLASS AND THE MERCANTILE AND TRADING CLASS IN THE REGISTRATION STATES, 1900, BY AGE GROUPS.

[From report of the Bureau of the Census on Vital Statistics, 1900.]

Age at death.	Death rate per 1,000 among—		
	Compositors, printers, and pressmen.	The manufacturing and mechanical class.	The mercantile and trading class.
15 to 24 years	5.05	4.43	2.60
25 to 44 years	12.29	8.35	6.72
45 to 64 years	20.01	20.16	19.91
65 years or over	108.80	105.43	93.79

According to this table the death rate of printers at ages 15 to 24 was 5.05 per 1,000, compared with 4.43 for men in the mechanical and manufacturing class, and only 2.60 for the mercantile and trading class. At ages 25 to 44 the rate was 12.29 for printers, but only 8.35 and 6.72, respectively, for the other two selected groups of occupations. At ages 45 or over the differences in the mortality of printers compared with other occupations were very slight, due in all probability to the fact that on the one hand most of those at all liable to consumption had died, and that on the other many of the impaired in health had left the trade. In addition, there is also the factor of a possible defect in the census enumeration.

Every investigation which has been made into the mortality rate of printers has confirmed these startling facts of health-injurious circumstances apparently inherent in the trade. In Rhode Island, out of 81 deaths of printers recorded during the ten-year period ending with 1906, 21, or 25.9 per cent, were from consumption and 15, or 18.5 per cent, from other respiratory diseases. At the forty-sixth session of the International Typographical Union, held at Milwaukee, Wis., in 1900, a statistical summary was submitted showing that out of 419 deaths of printers, 192, or 45.8 per cent, had been deaths from

[a] Report of the Bureau of the Census on Vital Statistics, 1900, p. cclxxxii.

diseases of the lungs or air passages, including under this term bronchitis, asthma, pulmonary consumption, pneumonia, and all other respiratory diseases. Of the 411 printers whose ages at death were known, 44, or 10.7 per cent, died at the age of 65 or over, while the average age at death was only 41.25 years, compared with 52.2 years for all males aged 15 or over in the registration area of the United States in 1900.

A thorough and extended investigation into the sanitary conditions of the printing trade was published as part of the report of the New York state bureau of labor statistics in 1906, prepared by Mr. George A. Stevens, statistician. This investigation included the entire mortality of the International Typographical Union for the five years ending with 1905, or 2,498 deaths, representing a mean death rate of 12.63 per 1,000. The rate was highest among the printers of New York City, or 16.32 per 1,000, and lowest in Chicago, or 10.12 per 1,000. The average age at death for all printers was not quite 45 years. The disease most frequent and severe among compositors was found to be tuberculosis of the lungs. The average age at death of compositors dying from tuberculosis was only 36.33 years. Out of 2,498 deaths from all causes, 660, or 26.4 per cent, were from tuberculosis, equivalent to an annual mean death rate of 3.34 per 1,000. Pneumonia caused 258 deaths, or 10.3 per cent of the deaths from all causes, equivalent to an annual mean death rate of 1.30 per 1,000. In commenting upon the high degree of consumption frequency the report points out that "scarcely any other occupation furnishes so large a quota of victims from consumption. The domestic life of printers is parallel to that of other artisans in equal financial circumstances. They are fairly compensated for their labor, thus enabling them to have homes as healthful as those procured by the best-paid workmen in any community. Neither can it be said that compositors are ill nourished and therefore rendered more susceptible to the tubercle bacilli. The determining cause of their susceptibility to the harmful process of the great white plague lies in a different direction—neglect of sanitary precautions in composing rooms."[a]

Of the mortality at known ages, from all causes, 18.9 per cent were deaths at 60 years of age or over. Of the 464 deaths in this group, 321 occurred between the ages of 60 and 69, 122 between 70 and 79, 19 between 80 and 89, 1 at age 90, and 1 at age 96.

The statistical data of the mortality rate among printers for the United States are fully confirmed by the corresponding statistics for German printers, which were published in a small treatise on the hygiene of the printing trade by Doctor Lewitt, of Berlin, in 1899. According to this authority, out of 1,390 recorded deaths of printers,

[a] Report of the New York Bureau of Labor Statistics, 1906, pp. cxxi and cxxii.

798, or nearly 61 per cent, were of diseases of the lungs and air passages, including 630 deaths from consumption. Of the total number, 243 had attained to the age of 60 or over, or 17.5 per cent of the mortality at known ages. The suggestions made by this writer regarding the prevention of tuberculosis and other diseases in the printing trade are eminently practical and feasible in most of the workshops in which printers are employed.

The most recent English mortality statistics of printers are for the three years ending with 1902, referred to in the Supplement to the Sixty-fifth Annual Report of the Registrar-General, in part as follows:

The death rates of printers were above the standard for occupied and retired males at all ages up to 35 years, but above that age they were below the standard. Within the main working period of life the comparative mortality figure of printers is 994, which practically corresponds to the standard; they show a slightly excessive mortality from influenza, nervous diseases, and Bright's disease; and their mortality from phthisis exceeds the standard by 60 per cent. On the other hand their mortality from circulatory and respiratory diseases is considerably below the average, and they appear to be subject to small risk from fatal accident, and to be but little addicted to alcoholism and suicide.

Since 1880–1882 there has been a continuous decline in mortality from phthisis, liver disease, and accident. It is also worthy of notice that the mortality from lead poisoning is now only one-fifth part as high as it was twenty years ago. From the other causes shown in the table the mortality in this occupation has fluctuated considerably.

The English occupation mortality statistics for printers are quite conclusive of the unfavorable effects of this occupation on health. In the table which follows the mortality from all causes among men in this employment is compared with that of occupied males generally, and the result is decidedly suggestive of conditions in this trade more or less unfavorable to life and health but in particular at the early ages, or 15 to 34, when the excess in mortality is from 1.62 to 0.45 per 1,000. This table is deserving of particular consideration in that it emphasizes the health-destructive circumstances of this employment at a very early period of life. Those who survive to age 35 or over do not apparently experience a decidedly unfavorable mortality in comparison with other occupations, and in this respect the English statistics are confirmed by the United States census statistics previously quoted. While the actual excess in the mortality of printers at ages 20 to 24 is only 1.62 per 1,000, this excess is equivalent to nearly 50 per cent of the normal mortality at this period of life.

MORTALITY FROM ALL CAUSES AMONG **PRINTERS**, COMPARED WITH THAT OF ALL OCCUPIED MALES IN ENGLAND AND WALES, 1900 TO 1902. BY AGE GROUPS.

[From Part II, Supplement to the Sixty-fifth Annual Report of the Registrar-General of Births, Deaths, and Marriages in England and Wales.]

Age at death.	Death rate per 1,000 for all occupied males.	Death rate for printers.		
		Rate per 1,000.	Greater (+) or less (−) than rate for all occupied males.	Ratio to rate for all occupied males.
15 to 19 years	2.44	3.19	+0.75	131
20 to 24 years	4.41	6.03	+1.62	137
25 to 34 years	6.01	6.46	+ .45	107
35 to 44 years	10.22	10.19	− .03	100
45 to 54 years	17.73	17.76	+ .03	100
55 to 64 years	31.01	30.76	− .75	99
65 years or over	88.39	87.61	− .78	99

The preceding table is self-explanatory and requires no further comment. A more extended comparison is made in the next table, in which the mortality of printers from consumption and other diseases of the respiratory system is compared with the normal mortality of occupied males from these diseases, by divisional periods of life. The comparison shows that at all ages the mortality of printers from consumption is excessive by from 0.49 to 2.11 per 1,000. The excess is most marked at ages 35 to 44, but the difference is a material one at all ages 20 to 64 inclusive. The corresponding mortality from other respiratory diseases among printers was slightly excessive at ages under 20 and comparatively high at ages 65 or over, but below the average at ages 20 to 64, inclusive. Apparently the employment does not predispose seriously to respiratory diseases except such as assume the pulmonary form of true consumption of a rapidly developing type most destructive to young printers at ages under 45. The table which follows requires no further comment and is otherwise self-explanatory.

MORTALITY FROM CONSUMPTION AND FROM OTHER DISEASES OF THE RESPIRATORY SYSTEM AMONG **PRINTERS**, COMPARED WITH THAT OF ALL OCCUPIED MALES IN ENGLAND AND WALES, 1900 TO 1902, BY AGE GROUPS.

[From Part II, Supplement to the Sixty-fifth Annual Report of the Registrar-General of Births, Deaths, and Marriages in England and Wales.]

Age at death.	Mortality from consumption.				Mortality from other diseases of the respiratory system.			
	Death rate per 1,000 for all occupied males.	Death rate for printers.			Death rate per 1,000 for all occupied males.	Death rate for printers.		
		Rate per 1,000.	Greater (+) or less (−) than rate for all occupied males.	Ratio to rate for all occupied males.		Rate per 1,000.	Greater (+) or less (−) than rate for all occupied males.	Ratio to rate for all occupied males.
15 to 19 years	0.54	1.03	+0.49	191	0.24	0.36	+0.12	150
20 to 24 years	1.55	3.41	+1.86	220	.48	.37	− .11	77
25 to 34 years	2.03	3.65	+1.62	180	.77	.55	− .22	71
35 to 44 years	2.74	4.85	+2.11	177	1.66	1.24	− .42	75
45 to 54 years	3.04	4.27	+1.23	140	3.32	2.17	−1.15	65
55 to 64 years	2.16	3.42	+1.26	158	6.54	5.16	−1.38	79
65 years or over	1.11	1.60	+ .49	144	17.77	20.76	+2.99	117

The recorded mortality of printers in industrial insurance experience was exceptionally large and representative of the trade, including 1,590 deaths from all causes, of which 613, or 38.6 per cent, were from consumption. Of the mortality of printers from other respiratory diseases, 169 were from pneumonia, 28 from asthma and bronchitis, and 24 from less frequent respiratory diseases. If the deaths from consumption and other respiratory diseases are combined, 52.5 per cent of the mortality of printers was from diseases of the lungs and air passages. The excess in the consumption mortality of printers is decidedly suggestive of a typical indoor employment, where the exposure to the inhalation of metallic dust in minute particles is continuous and more or less unavoidable. While the consumption mortality of printers was excessive at all ages, the excess was most pronounced at 25 to 34, when out of every 100 deaths from all causes 56.3 were from consumption against a normal expected proportion of 31.3. The analysis of the consumption mortality of printers in detail is set forth in the following table:

PROPORTIONATE MORTALITY FROM CONSUMPTION AMONG **PRINTERS**, 1897 TO 1906, COMPARED WITH THAT OF ALL MALES IN THE REGISTRATION AREA OF THE UNITED STATES, 1900 TO 1906, BY AGE GROUPS.

[Figures for printers from experience of an industrial insurance company; figures for males in the registration area computed from mortality statistics of the United States census.]

Age at death.	Deaths of printers, 1897 to 1906, due to—		Per cent of deaths due to consumption among—	
	All causes.	Consumption.	Printers.	Males in registration area, 1900 to 1906.
15 to 24 years	344	167	48.5	27.8
25 to 34 years	439	247	56.3	31.3
35 to 44 years	346	140	40.5	23.6
45 to 54 years	211	42	19.9	15.0
55 to 64 years	142	13	9.2	8.1
65 years or over	108	4	3.7	2.7
Total	1,590	613	38.6	14.8

The preceding observations and statistical data, derived from both American and foreign sources, fully confirm the conclusions that the printing trade is subject to decidedly unfavorable circumstances more or less responsible for the comparatively high degree of consumption frequency disclosed by both the general vital statistics of the occupation and the observed mortality of this class of labor in industrial insurance experience.

COMPOSITORS.

Compositors, considered as a distinct occupation (for most printers are also compositors), are exposed to practically the same health-injurious conditions as are persons engaged in the other occupations

of the printing business, and in addition they suffer from eye strain, which may, under given conditions, affect very seriously the disease-resisting capacity of the system. Stereotyping might have been included here, and its enormous development as a separate branch of the printing trade would warrant special consideration if any really authenticated observations had been made a matter of record useful for the present purpose. In stereotyping the liability to lead poisoning is a serious factor, affecting especially the men employed in melting the alloy and ladling it into the forms. The same observation applies to operatives on linotype machines, but our present information regarding these employments is too indefinite to warrant the conclusion that the exposure to the risk of plumbism increases materially the mortality from tubercular and respiratory diseases. There are no general vital statistics of compositors separate from those of printers and pressmen, since in both American and foreign statistics these employments are considered as a group.

In the occupation mortality statistics of Rhode Island out of 12 deaths from all causes of compositors recorded during the ten years ending with 1906, 3, or 25 per cent, were from consumption and 2 from other respiratory diseases, or a total of 41.7 per cent of the deaths of compositors were from diseases of the lungs and air passages.

There may be included in this brief reference an extract from a letter by Mr. J. W. Sullivan, a New York City printer, in the Typographical Journal for November, 1903, and reprinted in the annual report of the New York bureau of labor statistics for 1906, in part as follows:

Typesetting is exhaustive work. Standing hour by hour brings on backache, and in some men varicose veins and swollen feet. Sitting on the high printing-office stools doubles the typesetter up, constraining his arm motions and interfering with his digestion. The linotype operator's stool is too low, as it throws his legs into cramped positions. From the pot of molten type metal under his machine comes a trying heat and offensive gases. He must watch the delicate machinery lest it go wrong. The electric light thrown on his copy often sharply conflicts with the daylight. His keyboard work with wrist and fingers and his handling of hot slugs sometimes results in numbness that threatens scrivener's palsy. Whether typesetter or linotype operator, the compositor's brain is active every moment during the workday. Composition can never be wholly mechanical. Attention must be given to deciphering the copy, to spelling, to capitalizing, punctuating, office style, and correcting the lines as composed. Each of these distinct mental acts, on the whole tedious and monotonous, helps to drain the bodily forces. As the brain becomes fatigued its cells shrink. With every type a man sets there is a touch of wear on the cerebral tissue itself, only to be repaired by the restorative operations of nature—through food, rest, and sleep.

The recorded mortality of compositors in industrial insurance experience affords an opportunity to separately consider this employ-

ment as distinct from that of printers. The mortality from all causes was 168, of which 59, or 35.1 per cent, were from consumption. Of the mortality of compositors from other respiratory diseases, 19 were from pneumonia, 1 from asthma, and 5 from less frequent respiratory diseases. If the deaths from consumption and from other respiratory diseases are combined, 50 per cent of the mortality of compositors was from diseases of the lungs and air passages. The excess in the consumption mortality of compositors is still more clearly brought out in the tabular presentation of the proportionate mortality from this disease by divisional periods of life. While the consumption mortality was excessive at all ages under 55, the excess was most pronounced at ages 25 to 34, when out of every 100 deaths from all causes 66.7 were from consumption, against a normal expected proportion of 31.3. While at this period of life the proportionate consumption mortality of compositors was higher than the corresponding mortality of all printers, the proportions were somewhat less at other divisional periods of life, and at ages 55 and over the numbers were too small for a safe conclusion. The analysis of the consumption mortality of compositors in detail is set forth in the table below:

PROPORTIONATE MORTALITY FROM CONSUMPTION AMONG **COMPOSITORS**, 1897 TO 1906, COMPARED WITH THAT OF ALL MALES IN THE REGISTRATION AREA OF THE UNITED STATES, 1900 TO 1906, BY AGE GROUPS.

[Figures for compositors from experience of an industrial insurance company; figures for males in registration area computed from mortality statistics of the United States census.]

Age at death.	Deaths of compositors, 1897 to 1906, due to—		Per cent of deaths due to consumption among—	
	All causes.	Consumption.	Compositors.	Males in registration area, 1900 to 1906.
15 to 24 years	21	6	28.6	27.8
25 to 34 years	54	36	66.7	31.3
35 to 44 years	32	12	37.5	23.6
45 to 54 years	19	3	15.8	15.0
55 to 64 years	33	1	3.0	8.1
65 years or over	9	1	11.1	2.7
Total	168	59	35.1	14.8

The preceding observations and statistical data, derived from industrial insurance experience, confirm the conclusion that compositors as a class are exceptionally liable to diseases of the lungs, and that the degree of consumption frequency is decidedly excessive and apparently more so than in the printing trade as a whole.

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PRESSMEN.

Pressmen in printing plants may be separately considered, although the information regarding this occupation is rather fragmentary and inconclusive. Arlidge comments on the hygienic aspects of the employment in part as follows:

Their old mode of working has been superseded by the wonderful development of the modern printing machine, whereby the pressman has become little else than an attendant upon it; and we see the marvelous machine in newspaper offices strike off, fold, and count the sheets by thousands in an hour. Bodily strength is consequently at a discount, and the disadvantages of the occupation limited to the heat of the press room—caused principally by the heated cylinders of the press, and to a greater or smaller extent, where coal gas and not electricity is used for lighting, by the gas jets. Add to these the noise of the machines, the standing posture, and confinement in the press room and sustained attention to their work, and there remains nothing else calculated to injure the pressman's health, barring circumstances within his own control.

The occupation of pressmen does not appear to have attracted the special attention of American writers on occupation mortality, but it is safe to assume that the disease liability of this class, and in particular the degree of consumption frequency, do not materially differ from the observed mortality of men employed in the printing trade generally. More definite data, however, would supply a much to be desired addition to our at present very limited knowledge regarding the specific occupation mortality of this employment.

ENGRAVERS.

Engravers are not a very numerous, but a widely distributed, class of workmen, whose occupation is sufficiently well defined to warrant separate consideration. According to the census of 1900 there were 11,156 engravers in the United States. Engravers upon copper, steel, or other metals are subject to much the same conditions injuriously affecting health and life, and the differentiation of the employment according to the kind of metal worked upon is not practicable.

The employment decidedly predisposes to consumption, and all the available data indicate an excessive proportion of deaths from this disease among engravers, at least during the active working period of life. Aside from health-injurious factors directly resulting from operations and processes inseparable from the employment, there is also the unfavorable effect of a sedentary occupation demanding a fixed and stooping position. Arlidge has called attention to the fact that there are other accessory conditions unfavorable to health in this employment, such as the frequent use of strong light, severe taxing of the eyes,[a] and the employment of strong acids.

[a] For an extended discussion of the cause of eye strain see Biographic Clinics, Vol. IV, by George M. Gould, M. D., Philadelphia, 1906, pp. 61 et seq.; also Popular Science Monthly for December, 1905.

Some fairly conclusive data are available regarding the mortality of engravers, with particular reference to consumption, but as an interesting case of extreme longevity mention may be made of the death of a Mr. Charles Harris at the age of 93, who for more than half a century had been an engraver of the American Bank Note Company. A somewhat similar case was the death of a Mr. James P. Mayer, who, at his death at the age of 83, was considered the oldest American steel engraver on record.

These, however, are but illustrations of exceptions and rather mark the rule of the comparative infrequency of extreme longevity among men in this employment. Thackrah held that "engravers and copperplate printers present few examples of old age," but he may have included printers and lithographers and similar employments under this term. Tracy, writing with reference to more recent and American conditions, holds that engravers, in common with lapidaries and watchmakers, are very liable to phthisis. It is probably quite true, as pointed out by Sommerfeld, that the amount of metallic or mineral dust generated in this occupation is comparatively small in quantity, but it is practically certain to be injurious in its effects just because of the minuteness of the particles. According to Sommerfeld's data, 23.6 per cent of all cases of sickness of engravers were diseases of the lungs and air passages. He suggests, among other points, as a precaution, extreme care in the physical selection of engravers' apprentices to eliminate those already predisposed to consumption. He further suggests the proper ventilation of the workshops, which in most cases is almost entirely neglected. The evidence of such neglect is brought out by the consumption mortality data of this employment for the State of Rhode Island, according to which, out of 142 deaths of engravers recorded during the half century ending with 1902, 45, or 31.7 per cent, were from consumption, against a normal mortality from this disease among men in all occupations in Rhode Island of 17.8 per cent.

The recorded industrial insurance mortality experience of engravers includes 192 deaths from all causes, of which 67, or 34.9 per cent, were deaths from consumption. Of the mortality of engravers from other respiratory diseases, 18 were from pneumonia, 1 from asthma, and 3 from less frequent respiratory diseases. If the deaths from consumption and from other respiratory diseases are combined, 46.4 per cent of the mortality of engravers was from diseases of the lungs and air passages. The excess in the consumption mortality of engravers is still more clearly brought out in the tabular presentation of the proportionate mortality from this disease by divisional periods of life. While the consumption mortality was excessive at all ages, the excess was most pronounced at 25 to 34, when out of every 100 deaths

from all causes 61.7 were from consumption, against a normal expected proportion of 31.3. The analysis of the consumption mortality of engravers in detail is set forth in the following table:

PROPORTIONATE MORTALITY FROM CONSUMPTION AMONG ENGRAVERS, 1897 TO 1906, COMPARED WITH THAT OF ALL MALES IN THE REGISTRATION AREA OF THE UNITED STATES, 1900 TO 1906, BY AGE GROUPS.

[Figures for engravers from experience of an industrial insurance company; figures for males in the registration area computed from mortality statistics of the United States census.]

Age at death.	Deaths of engravers, 1897 to 1906, due to—		Per cent of deaths due to consumption, among—	
	All causes.	Consumption.	Engravers.	Males in registration area, 1900 to 1906.
15 to 24 years	31	12	38.7	27.8
25 to 34 years	47	29	61.7	31.3
35 to 44 years	42	19	45.2	23.6
45 to 54 years	34	5	14.7	15.0
55 to 64 years	19	2	10.5	8.1
65 years or over	19	.....	.....	2.7
Total	192	67	34.9	14.8

The preceding observations and statistical data, derived from industrial insurance experience, would seem to warrant the conclusion that engravers are subject to more or less unfavorable effects of their employment, resulting in a decidedly high degree of consumption frequency at early ages, but in particular at ages 15 to 44.

SUMMARY OF CONCLUSIONS REGARDING OCCUPATIONS WITH EXPOSURE TO METALLIC DUST.

Ten occupations exposed to metallic dust have been considered in detail. It is not possible in all cases to base conclusions upon identical data, since for a number of occupations no official vital statistics are available. As a method of indicating with approximate accuracy the possible effect of health-injurious employment, use may, however, be made of the statistics exhibiting the age distribution of persons in this group, and when the employments for which the data are available are combined the number of such persons under observation in the last census year was 219,579. Of this number only 3,544, or 1.6 per cent, had attained to an age of 65 years or over, against a normal expected proportion of 4.6 per cent. While it is quite probable that, to a certain extent, this small number of persons of advanced age in occupations exposing to metallic dust is the result of occupation selection, or conditions favorable to the employment of young persons, the result is, nevertheless, decidedly suggestive of conditions more or less unfavorable to health and life. The details of the age distribution

are given in the following table, by divisional periods of life, together with the corresponding percentage distribution of all occupied males, the data for both groups being derived from the census of 1900.

NUMBER AND PER CENT OF MALES IN EACH AGE GROUP IN OCCUPATIONS EXPOSED TO METALLIC DUST, COMPARED WITH NUMBER AND PER CENT IN ALL OCCUPATIONS, 1900.

[From report of the Bureau of the Census on Occupations, 1900.]

Age.	Males in occupations exposed to metallic dust.		All occupied males.	
	Number.	Per cent.	Number.	Per cent.
15 to 24 years	75,663	34.4	5,933,720	26.0
25 to 34 years	69,998	31.9	5,993,847	26.3
35 to 44 years	41,246	18.8	4,704,682	20.6
45 to 54 years	19,711	9.0	3,250,259	14.3
55 to 64 years	9,407	4.3	1,856,181	8.1
65 years or over	3,554	1.6	1,063,856	4.7
Total	219,579	100.0	22,802,545	100.0

According to this analysis the proportion of males aged 15 to 34 was unusually large in this group of occupations, or 66.3 per cent, against 52.3 per cent expected. At ages 35 to 44 the proportion was 18.8 per cent for the group under consideration, against 20.6 per cent among occupied males generally, while at ages 45 or over the percentage proportion of males employed in occupations with exposure to metallic dust was only 14.9 per cent, against 27.1 per cent for occupied males generally. Since most of the trades considered do not involve a very considerable amount of muscular labor, it would seem safe to assume that the unfavorable age distribution is the result of a high death rate, rather than because of occupation selection, more or less favorable to the employment of persons below the age of 35 years.

It is unfortunately not possible to present a combined summary of the census vital statistics of males employed in the occupations included in this group, since it is only for printers and compositors that the census data have been made public. If, however, the mortality statistics for printers and compositors are compared with the corresponding statistics for all occupied males, the death rates are above the average and decidedly so at ages 25 to 44. The death rate from consumption was 4.36 per 1,000, against 2.37 for all occupations, while the death rate from other respiratory diseases was slightly below the average, or 1.54 against 1.97 expected.

The occupation mortality statistics of Rhode Island are available for 8 specific occupations with exposure to metallic dust and when combined return 791 deaths from all causes, of which 229 were from consumption and 99 from other respiratory diseases. The corresponding percentages were 29 per cent of deaths from consumption for

persons employed in occupations with exposure to metallic dust, against 17.8 per cent for occupied males generally in the State of Rhode Island. The percentage of deaths from other respiratory diseases was 12.5 per cent, which was exactly the same as for all occupied males in Rhode Island.

The English vital statistics for this group of occupations are available for tool and instrument makers, brass workers, and printers and compositors. When the returns for these occupations are combined, they exhibit excessive death rates at every period of life, as set forth in tabular form, as follows:

MORTALITY FROM ALL CAUSES, FROM CONSUMPTION, AND FROM OTHER DISEASES OF THE RESPIRATORY SYSTEM, IN **OCCUPATIONS EXPOSED TO METALLIC DUST,** COMPARED WITH THAT OF ALL OCCUPIED MALES IN ENGLAND AND WALES, 1900 TO 1902, BY AGE GROUPS.

[From Part II, Supplement to the Sixty-fifth Annual Report of the Registrar-General of Births, Deaths, and Marriages in England and Wales.]

Age at death.	Death rate per 1,000 due to all causes among—		Death rate per 1,000 due to consumption among—		Death rate per 1,000 due to other diseases of the respiratory system.	
	All occupied males.	Occupations exposed to metallic dust.	All occupied males.	Occupations exposed to metallic dust.	All occupied males.	Occupations exposed to metallic dust.
15 to 19 years.....	2.44	2.73	0.54	0.73	0.24	0.30
20 to 24 years.....	4.41	5.28	1.55	2.73	.48	.45
25 to 34 years.....	6.01	6.29	2.03	3.33	.77	.69
35 to 44 years.....	10.22	11.68	2.74	5.05	1.66	1.62
45 to 54 years.....	17.73	20.97	3.04	5.22	3.32	3.55
55 to 64 years.....	31.01	36.03	2.16	3.91	6.54	7.94
65 years or over...	88.39	92.52	1.11	1.54	17.77	22.46

The table shows that the mortality from consumption among men in occupations with exposure to metallic dust was decidedly excessive at all ages and extremely high throughout life, while the corresponding mortality rate from respiratory diseases other than consumption was fairly normal and slightly below the average at ages 20 to 44.

The industrial insurance mortality statistics are available for nine occupations included in this group, returning in the aggregate 3,502 deaths from all causes, and of this number 1,292, or 36.9 per cent, were from consumption. The deaths from other respiratory diseases numbered 469, or 13.4 per cent. The expected consumption percentage by the standard adopted for the registration area of the United States was 14.8 per cent for consumption and 11.7 per cent for other respiratory diseases. When the mortality from consumption and from respiratory diseases other than consumption are combined, the proportionate number of deaths among men in occupations with exposure to metallic dust is found to be 50.3 per cent from this group of causes, against 26.5 per cent expected.

PROPORTIONATE MORTALITY FROM CONSUMPTION IN **OCCUPATIONS EXPOSED TO METALLIC DUST,** 1897 TO 1906, COMPARED WITH THAT OF ALL MALES IN THE REGISTRATION AREA OF THE UNITED STATES, 1900 TO 1906, BY AGE GROUPS.

[Figures for occupations exposed to metallic dust from experience of an industrial insurance company; figures for males in registration area computed from mortality statistics of the United States census.]

Age at death.	Deaths in occupations exposed to metallic dust, 1897 to 1906, due to—		Per cent of deaths due to consumption among—	
	All causes.	Consumption.	Occupations exposed to metallic dust.	Males in registration area, 1900 to 1906.
15 to 24 years	619	288	46.5	27.8
25 to 34 years	892	510	57.2	31.3
35 to 44 years	739	313	42.4	23.6
45 to 54 years	518	121	23.4	15.0
55 to 64 years	398	47	11.8	8.1
65 years or over	336	13	3.9	2.7
Total	3,502	[a] 1,292	[a] 36.9	[b] 14.8

[a] There were also 469 deaths from other diseases of the respiratory system, or 13.4 per cent of the deaths from all causes.
[b] The per cent of deaths from other diseases of the respiratory system in the registration area was 11.7.

It is evident from the foregoing observations and statistical data relating to a sufficient number of representative employments with exposure to metallic dust, that the health-injurious effects of such exposure are reflected in the comparatively small proportion of persons of advanced years, a high general death rate, and very high specific death rates from consumption and other respiratory diseases.

OCCUPATIONS WITH EXPOSURE TO MINERAL DUST.

In the group of occupations exposing to a continuous and considerable inhalation of mineral dust resulting from industrial processes, have been included for the present purpose the following representative employments: Stone workers, marble workers, glass blowers, glass cutters, diamond cutters, potters, cement workers, plasterers, paper hangers, molders, core makers, and lithographers. These occupations are all more or less subject to an excessive death rate from all causes, but in particular to a decided excess in the proportionate mortality from consumption, and in most cases also to a comparatively high degree of frequency in the occurrence of respiratory diseases. The details of labor conditions as far as they could be conveniently included in the following summary of observations regarding particular trades appear to fully confirm the opinion that the degree of excess in consumption frequency is intimately related and in almost exact proportion to the degree of exposure to continuous and considerable inhalation of mineral dust.

THE STONE INDUSTRY.

The stone industry in the United States is of considerable extent and wide dispersion over practically the entire country. The number of males of known ages 15 or over employed as stone and marble cutters in the United States in 1900, according to the census, was 54,039, but it is quite probable that this total does not include stone polishers, sawyers, and other similar occupations peculiar to the stone industry. The health of stone and marble cutters has, from earliest times, been held to be notoriously bad, and the hygienic importance of this trade was recognized by Ramazzini, who, as far back as 1705, discussed the subject in an entire chapter in his work on occupation mortality, stating that "in hewing marble or stones out of the rock, in polishing and cutting them, they oftentimes suck in, by inspiration, the sharp, rough, and cornered small splinters or particles that fly off; so that they are usually troubled with a cough, and some of them turn asthmatic and consumptive. * * * Our medical histories give many instances of stones found in the stomach and lungs of these workmen, for which we can assign no other material cause but the dusty particles taken in at the mouth and gradually gathered into a heap. * * * Withal, all possible caution must be used to avoid the sucking in of these minute particles at the mouth."

From the earliest to the most recent observers upon the health conditions in this trade, the conclusions have been decidedly unfavorable and suggestive of circumstances more or less possible of material improvement. Oliver, in his treatise on Diseases of Occupation, remarks, with special reference to stone masons:

> The occupation of the stone mason and of the quarryman has for long been regarded as one in which a higher death rate from lung disease occurs than in most occupations. The disease, which usually assumes a chronic character, is slow in its development and progress. As it is attended by the ordinary physical signs and symptoms observed in other forms of pneumokoniosis, the malady calls for no special description other than this, that in contradistinction to miners' phthisis, which occurs in men who work underground, stone masons' phthisis is met with in men who are working in the open air, a circumstance which becomes a strong argument in favor of the dust origin of pneumokonioses as against the bacillary. After a time the lung disease becomes tuberculous, hence the extraordinary fact of the death rate from pulmonary tuberculosis among stone masons and marble cutters, who are following an outdoor occupation, being six times that of bankers and brokers, who are leading an indoor life. This want of harmony between occupation and mortality from pulmonary phthisis is observed in other outdoor occupations than stone-cutting. It would appear, therefore, as if the predisposing causes of lung disease are often of greater importance than the exciting—in other words, that the soil is of as much, if not of greater, influence than the seed. The irritation of the lung caused by dust would seem

in some instances, especially in the early stages of the disease, to create a favorable soil for the implantation of the tubercle bacillus, while in the slowly developed forms of pneumokoniosis the hard and unyielding fibrous tissue does not offer the same attractions to the micro-organism, and as a consequence it is in those parts of the lung where the structure is least fibrous that the tubercle bacilli exert their greatest power for harm.(a)

The remarks of Oliver are fully sustained by the available statistical evidence. The secretary of the Operative Masons' Society of London, in his testimony before the committee on industrial diseases, produced the mortality record for Newcastle for the period 1871 to 1896, including an account of 160 deaths of stone masons, and of this number 71, or 44.4 per cent, had died from phthisis, at an average age of only 42.23 years. It was admitted, however, that conditions had improved, and more recent data resulted in a more favorable showing. Out of 253 deaths of stone masons reported in 1905 by the same society, 79, or 31.2 per cent, were deaths from consumption. The same witness stated that the average age at death of those dying from phthisis during 1905 was 44 years, against 51 years for deaths from all causes.(b)

Conditions are probably somewhat different in this country, due to the more general use of pneumatic tools, which generate considerable quantities of fine dust, the complete prevention of which is always difficult and often is impossible. The degree of disease liability varies materially according to the specific occupation, and the risk is less in the case of paving-stone cutters and slate splitters than in the case of monument or custom work, which requires close attention in matters of minute detail and which is more often carried on indoors. Surfacing and carving and cutting with pneumatic tools are the most dangerous employments, and the risk is less in polishing, grinding, sawing, and lathe work, most of which is carried on by the wet process. Large quantities of dust are stirred up, however, in the brushing off and cleaning up of the accumulated dust, and in the moving of materials, dropping of slabs, etc. There is, therefore, more or less dust exposure in all branches of the stone industry, but the results of exposure vary according to the kind of material, which includes a large variety of stones, chiefly, however, granite, marble, limestone, sandstone, bluestone, slate, etc.

The stonecutter's trade is one which requires both skill and arduous physical labor. The men as a rule work in the open air, and in very warm or wet weather under shelter; but all are liable to inhale the dust and small particles from the material upon which they operate. This on some kinds of stone is much more deleterious to health than

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[a] Diseases of Occupation, London, 1908, p. 305.

[b] Minutes of Evidence, Departmental Committee on Compensation for Industrial Diseases, p. 322.

on others, the stone containing the largest proportion of flints being much more injurious than that which has most lime in it. The returns show that the present age of stonecutters is three years less than that of carpenters or masons, while the average number of years at work exceeds that of either by nearly one year. But this is accounted for by reason of the difference in the ages at which they began to work, which by 63.9 per cent of stonecutters was under 15 years of age; while in the other two trades mentioned it was 13.8 per cent and 4 per cent, respectively. The explanation is that in England, Ireland, and Scotland, as well as in other European countries, seven years are the rule for apprenticeship of stonecutters, and a large proportion are taken when 12 years old, and quite a number under this age. Eighty-three and one-half per cent of the total number were foreign born and but 16.5 per cent American born; and of the latter but nine-tenths of 1 per cent began to work under 15 years of age; while 15.4 per cent of carpenters and 25.6 per cent of masons began to work at their respective trades after the age of 20 years and upward, none of the stonecutters had reached this age. This fully accounts for the differences above noted.[a]

In his discussion of the hygiene of this occupation Lloyd makes the following observations:

Stonecutters and quarrymen suffer in various degrees from the inhalation of dust. The extent of the evil in their cases depends upon, first, the character of the dust and, second, the circumstances amid which the work is pursued. The quality of the stone has much to do with the extent of pulmonary disease among stonecutters. Some stone is much more dusty than others. A sedimentary stone, for instance, that was formed originally simply by the deposit of earthy and siliceous particles under water is much more liable to give off a large quantity of dust than is a stone that was fused in early geological ages—the igneous stones, for instance, like granite. Although the particles from these latter stones are exceedingly hard, yet there is not much true dust, only the particles actually displaced by the contact with the tool being thrown off. These probably do not carry far in the air, and are mostly too large to gain access to the alveoli as dust. This was the explanation given by Hamilton, of Aberdeen (quoted by Arlidge), for the fact that the masons and polishers at the Aberdeen quarries do not suffer much, if any, with industrial phthisis.

A brief abstract from a special report of the Massachusetts state board of health on dangerous occupations, as suggestive evidence particularly applicable to American conditions at the present time, is also included here:

It is preeminently a dusty trade, and the workmen are, therefore, exposed to the danger of inhaling nonabsorbable and irritating particles of mineral matter. Accidents to the eyes from flying chips are also very common, but they are generally less serious than those due to fragments of steel from the tools employed. Of the various kinds of stone dust, granite is regarded as more injurious than marble, and

[a] Fourteenth Annual Report of the Bureau of Statistics of Labor and Industries of New Jersey, 1891, pp. 176, 177.

soapstone the least of all; but different granites vary in this particular, some yielding a much finer dust than others, on account of differences in texture. The greatest amount of dust comes from the surfacing machines, which are operated with compressed air. The tool is either a large hammer or an instrument which presents four smaller separate faces. Sometimes a bushing hammer, made of thin, chisel-like blades bolted together, is used; this creates the finest dust of all. The men who operate the surfacing tools rarely wear masks, but many chew tobacco and spit, in the belief that the practice serves to protect them from the effects of the dust to which they are exposed. Some protect themselves from flying chips by means of wire screens placed about the hammer; some wear wire masks and some wear glasses. By a union regulation, surfacing is done in the open sheds in the yard. While the operation of smoothing can not be done by the wet process, on account of clogging of the tools with the pasty material which would thereby be produced, polishing is conducted with the application of water, which prevents the evolution of dust. The sawing of granite and marble into slabs is conducted ordinarily by the wet process, and is therefore unattended by dust; but soapstone sawing and cutting for joints is frequently done dry, and with the evolution of much fine dust. Turning in lathes is conducted in the wet way, and is dustless.

Of 343 deaths which occurred in the city of Quincy among stonecutters during a period of about sixteen years, no fewer than 142 (41.4 per cent) were due to pulmonary tuberculosis, 41 (12 per cent) to other diseases of the lungs, 44 (12.8 per cent) to diseases of the heart, 24 (7 per cent) to violence, and 92 (26.8 per cent) to all other causes. Excluding accidents, the percentage due to tuberculosis was 44.5. These statistics show even more strikingly than those quoted in a report submitted two years ago the dangerous character of this occupation. Therein it appears that, of a total of 30,000 deaths among stonecutters, tuberculosis was the cause in 28.57 per cent. It must be said, however, that the average age at death of the victims of the disease in this industry, so far at least as the Quincy records show, is somewhat high (47.8 years), but it is to be borne in mind that the calling is one which is not open to the naturally weak, and that many of those who become incapacitated through infection drift into other lines of industry in which physical strength is not so essential, and hence at death are not returned as belonging to this class.

STONEWORKERS.

No very satisfactory data for this country are available to determine with accuracy the probable degree of difference in the health-injurious conditions resulting from the cutting or manipulation otherwise of the different kinds of stone, such as granite, sandstone, limestone, bluestone, slate, etc., except marble-cutters, to be separately considered as a well-defined branch of the trade. The term stonecutter is, therefore, practically inclusive of all branches of the industry and of all the different employments necessary in connection therewith. An observer of conditions in the sandstone industry states that "stonecutters who work on sandstone seldom live to be 50 years

of age, and nearly all of them die of lung disease due to the inhalation of mineral dust;" but how far this is sustained by actual experience in the regions where sandstone is quarried and cut can not be stated at present. A physician of long residence in the New Bedford, Ind., limestone field, states that he has not observed very serious consequences to result from employment in that branch of the stone industry, but all such observations are subject to serious error in the absence of trustworthy statistical data for a period of years.

The Vermont state board of health has reported the mortality by occupations during the six years ending with 1905, and during that time there were 204 deaths from all causes among the granite and stone cutters and workers in that State. Of those deaths 80, or 39.2 per cent, were from consumption, and 27, or 13.2 per cent, from other respiratory diseases. Of the deaths from all causes among granite and stone cutters and workers in Vermont, 52.4 per cent was due either to consumption or to other respiratory diseases.

In the State of Rhode Island during the period 1897–1906, 125 deaths of stone and marble cutters and workers were recorded, and of this number 40, or 32 per cent, were from consumption, compared with the average of 17.7 per cent for men in all occupations in that State. The census mortality statistics for 1900 combine marble and stone cutters into one group, including 26,141 males aged 15 years or over in the registration States. Of the number stated, 659, or 2.5 per cent, had attained to 65 years of age or over, which compares with 3.9 per cent for men in mechanical and manufacturing industries generally. In the mortality from all causes the death rate was comparatively low at ages under 25, but high at ages 25 or over, as shown in detail in the table following. The census mortality statistics, however, are subject to the criticism that in all probability the facts are understated on account of defective enumeration, and the table must, therefore, be used with caution.

MORTALITY FROM ALL CAUSES AMONG **MARBLE AND STONE CUTTERS**, COMPARED WITH THAT OF THE MANUFACTURING AND MECHANICAL CLASS AND THE MERCANTILE AND TRADING CLASS, IN THE REGISTRATION STATES, 1900, BY AGE GROUPS.

[From report of the Bureau of the Census on Vital Statistics, 1900.]

Age at death.	Death rate per 1,000 among—		
	Marble and stone cutters.	The manufacturing and mechanical class.	The mercantile and trading class.
15 to 24 years	3.35	4.43	2.60
25 to 44 years	9.32	8.35	6.72
45 to 64 years	24.72	20.16	19.91
65 years or over	122.91	105.43	93.79

A further difficulty in connection with the vital statistics of stone and marble cutters results from the fact that men in this trade are a very mobile element, frequently moving from one place to another in response to better trade conditions, higher wages, etc., in other fields. The most suggestive results of the census mortality investigation is the extraordinary death rate from consumption, which is returned at 5.41 per 1,000, compared with 2.62 for the mechanical and manufacturing class, and 1.66 for the mercantile and trading class. The statistics of Rhode Island and the United States census of 1900 confirm, therefore, the conclusion that consumption among men employed in the stone industry is of exceptional frequency and in fact by far the most common cause of death.

For reasons unknown, the Report of the Registrar-General for England and Wales does not specifically consider stonecutters, but they are combined with quarrymen in stone and slate, which, of course, precludes the utility of the resulting averages in an effort to determine the relative degree of consumption frequency in a well-defined specific occupation such as the stonecutter's trade. Even when considered as a group, however, quarrymen and stonecutters combined, according to English statistics, show an excessive mortality from consumption and other respiratory diseases, but it is a matter of regret that the data should not be separately available for men employed in the more important branches of the stone industry.

The recorded industrial insurance mortality experience of stoneworkers includes 858 deaths from all causes, of which 302, or 35.2 per cent, were from consumption. Of the mortality of stoneworkers from respiratory diseases other than consumption, 95 were from pneumonia, 13 from asthma, 30 from bronchitis, and 24 from less frequent respiratory diseases. If the deaths from consumption and from respiratory diseases other than consumption are combined, it is found that 54.1 per cent of the mortality of stoneworkers was from diseases of the lungs and air passages. The excessive mortality from lung diseases among stoneworkers is therefore sustained by all of the numerous investigations which have been made into the health conditions of this employment. The excess in the consumption mortality of stoneworkers is still more clearly brought out in the tabular presentation of the proportionate mortality from this disease by divisional periods of life. While the consumption mortality was excessive at all ages, the excess was most pronounced at ages 35 to 44, when out of every 100 deaths from all causes 47.7 were from consumption against an expected normal proportion of 23.6. The analysis of the consumption mortality of stoneworkers in detail is set forth in the table following.

PROPORTIONATE MORTALITY FROM CONSUMPTION AMONG **STONEWORKERS**, 1897 TO 1906, COMPARED WITH THAT OF ALL MALES IN THE REGISTRATION AREA OF THE UNITED STATES, 1900 TO 1906, BY AGE GROUPS.

[Figures for stoneworkers from experience of an industrial insurance company; figures for males in the registration area computed from mortality statistics of the United States census.]

Age at death.	Deaths of stoneworkers, 1897 to 1906, due to—		Per cent of deaths due to consumption among—	
	All causes.	Consumption.	Stoneworkers.	Males in registration area, 1900 to 1906.
15 to 24 years	21	10	47.6	27.8
25 to 34 years	114	60	52.6	31.3
35 to 44 years	172	82	47.7	23.6
45 to 54 years	232	91	39.2	15.0
55 to 64 years	199	52	26.1	8.1
65 years or over	120	7	5.8	2.7
Total	858	302	35.2	14.8

The preceding observations and statistical data, including the industrial insurance mortality experience of this class, fully confirm the conclusion that this occupation is to be classed as decidedly unhealthful and that the degree of consumption frequency is materially above the normal at all ages, but that the excess is most marked at ages 35 to 44.

MARBLE WORKERS.

Marble workers constitute a distinctive and well-defined group of the stone industry, which it has seemed best to consider separately, though most of the general statistics appertaining to the occupation are included in the stone industry considered as a whole. The American marble industry is centered chiefly in Vermont, where about 60 per cent of all the marble produced in the United States is quarried, and most of it is cut and dressed, sawed, or polished, as the case may be, in the locality where quarried. The Vermont state board of health has for some six years past reported the mortality by occupations, and of the deaths of marble workers reported in that State, out of a mortality of 42 from all causes, 5 were from consumption and 5 from other respiratory diseases. The fact that Vermont is an otherwise exceptionally healthful State goes far to mitigate the intrinsic dangers of the occupation resulting from continuous exposure to the inhalation of stone dust.

Bertillon, in his observations on morbidity and mortality, refers to stonecutters and workers in marble in Switzerland as being subject to a considerable mortality, principally from phthisis, which rapidly increases with age. Under 20 years of age, according to this authority, it is rarer than among the mass of the population; from 20 to 29 it equals the average, from 30 to 39 it is double, from 40 to 49 it is

triple, and from 50 to 59 it is four times the average rate of the Swiss as a nation. He also refers to Italian statistics, which are significant on account of the remarkable development of the marble industry at Carrara, stating that stonecutters and pavers average fewer days of sickness than the whole population up to 45 years, but considerably more above that age. At Paris the workers in marble are subject to a high death rate at all ages.

A very instructive descriptive account of the machine process as generally employed in the marble industry was included in the report on the stone industry for 1908, by Mr. W. C. Day, of the United States Geological Survey, from which the following extract is made as emphasizing the more or less health-injurious circumstances of employment in marble manufacture:

After being sawed the slabs are placed on a "rubbing bed," which consists of a circular cast-iron plate, from 8 to 15 feet in diameter, the older forms having a circular opening from 1 foot to 18 inches in diameter in the center. The plate is planed to a smooth surface and is mounted upon running gear so that it may revolve in a horizontal plane. Fixed arms, usually four in number, are sustained radially about one-fourth of an inch above the plate, either by an upright passing through the central opening or by a framework overhead (in the case of the newer solid forms of bed). The slabs of stone to be polished are placed upon the bed in front of the arms, and the bed is revolved slowly beneath them in such a direction as to hold them firmly against the arms. An abrading material, such as sand, sometimes mixed with "chilled shot," or crushed steel, with a constant supply of water, is fed upon the plate. If necessary, the stones are weighted to increase the friction. From this rubbing bed the slabs are removed to the emery bed, which is similar to the former, fine emery being used for abrasion. They are then rubbed down by hand with a fine, evenly grained sandstone, commonly called a "Scotch hone," with a sufficient supply of water, and smoothed off with pumice stone and water. The final polish is put on by rubbing the slabs upon a buffing bed, similar in form to the rubbing bed, but covered with a thick, specially prepared felt, upon which a small amount of "putty powder" (oxide of tin) is fed, to give a high gloss. The hand process consists in grinding on the rubbing bed as before, and then rubbing down by hand successively with Nova Scotia "blue stone," "red stone," "Scotch hone," and pumice stone, after which it is glossed with putty powder, or, in case of cheaper "onyxes" and common marbles, with a mixture of two parts of oxalic acid and one part of tin oxide.

In marble cutting, as in the stone industry generally, the introduction of pneumatic tools operated by compressed air has brought in a new and decidedly health-injurious factor, since the amount of dust generated by this process is very much greater than when the work is done entirely by hand with the ordinary chisel and mallet. Portable stone-dressing machines have been invented and quite widely

adopted, since in part the quality of the work done by these machines is superior to hand work, while the productive capacity is claimed to be from eight to fifteen times as much as when the work is done entirely by hand. Exhaust air is employed to keep the stone clean at the point of impact of the cutting tool, but the clouds of dust raised by this apparatus are considerable, even though the work is usually done outside of the shed. Aside from the dust generated in either machine or hand cutting, a vast amount of dust is produced during cleaning-up operations, and while labor organizations have, in part, provided against this risk by special regulations, the generation of much dust is practically unavoidable under the existing methods by which the work is carried on.

The United States census mortality statistics combine marble and stone cutters, so that it is impossible to separately consider statistically the mortality of this employment. As has been previously pointed out in discussing stonecutters generally, the evidence is entirely conclusive that the mortality from consumption and other respiratory diseases among this class is decidedly excessive. It is observed in the report on Vital Statistics of the census of 1890 (Vol. I, p. 144) that "it will be seen from the preceding table that among marble and stone cutters in the United States the greatest proportion of deaths was due to consumption, being much greater than the average proportion due to this cause in this class. The proportion of deaths of marble and stone cutters in the United States due to diseases of the respiratory system was greater than the average proportion in this class." The respective rates per 1,000 living were 3.15 for consumption against an average of 2.11 and 1.91 for other respiratory diseases against an average of 1.54 among occupied males in manufacturing and mechanical industries generally.

The recorded industrial insurance mortality statistics of marble cutters include 200 deaths from all causes, of which 56, or 28 per cent, were from consumption. Of the mortality of marble workers from respiratory diseases other than consumption, 26 were from pneumonia, 7 from asthma and bronchitis, and 3 from less frequent respiratory diseases. If the deaths from consumption and from respiratory diseases other than consumption are combined, 46 per cent of the mortality of marble workers was from diseases of the lungs and air passages. The excess in the consumption mortality of marble workers is less than the excess in the consumption mortality of stoneworkers generally, and this fact is still more clearly brought out in the tabular presentation of the proportionate mortality from this disease by divisional periods of life. While the consumption mortality was high during the entire active working lifetime of marble workers, the excess in the mortality was most pronounced at 25 to

34, when out of every 100 deaths from all causes 50 were from consumption, against a normal expected proportion of 31.3. The analysis of the consumption mortality of marble-cutters in detail is set forth in the table below:

PROPORTIONATE MORTALITY FROM CONSUMPTION AMONG **MARBLE CUTTERS**, 1897 TO 1906, COMPARED WITH THAT OF ALL MALES IN THE REGISTRATION AREA OF THE UNITED STATES, 1900 TO 1906, BY AGE GROUPS.

[Figures for marble-cutters from experience of an industrial insurance company; figures for males in registration area computed from mortality statistics of the United States census.]

Age at death.	Deaths of marble cutters, 1897 to 1906, due to—		Per cent of deaths due to consumption among—	
	All causes.	Consumption.	Marble-cutters.	Males in registration area, 1900 to 1906.
15 to 24 years	3	.....	.....	27.8
25 to 34 years	30	15	50.0	31.3
35 to 44 years	40	16	40.0	23.6
45 to 54 years	46	16	34.8	15.0
55 to 64 years	50	7	14.0	8.1
65 years or over	31	2	6.5	2.7
Total	200	56	28.0	14.8

The preceding observations and statistical data, derived from industrial insurance mortality experience, confirm the conclusion that the degree of dust exposure in this occupation is about the same as among stoneworkers generally and that the degree of consumption frequency among marble cutters is materially above the average, but decidedly so at ages 25 to 34.

THE GLASS INDUSTRY.

The glass industry in the United States gives employment to some 50,000 wage-earners, of whom about 10 per cent are children under 16 years of age. The industry is a varied one, including among others the manufacture of blown and pressed ware, of window glass and plate glass, and finally of so-called crystal or cut glass, which for the present purpose is considered as a separate industry. The labor division of the trade includes numerous and well-defined occupations, each of which is subject to more or less injurious circumstances, but of these the handling of materials and the mixing are the most liable to the risk of continuous inhalation of mineral dust. The most important employment is that of the glass blower, but there are few accurate statistics which separate this employment from the industry as a whole. For the present purpose, however, it has seemed best, as far as practicable, to consider the mortality of glass blowers by itself, although the medical observations subsequently to be quoted refer more or less to glass workers as a class. Changes in manufacturing processes and the introduction of labor-saving machinery have resulted

in sanitary improvements, which in consequence have had a favorable effect upon the health of glass blowers, at least in the United States, as far as the rather fragmentary statistical data can be relied upon. Among glass workers as a class, consumption is of exceptional frequency, in addition to which there is a comparatively high mortality from other respiratory diseases, lead poisoning, and heat prostration.

Thackrah, writing in 1832, held that glass workers as a class were liable to catarrh and cough, but not to pleurisy and pneumonia. He commented upon the appearance of a fine dust at the furnaces which, however, in his opinion did not produce any marked effect on the health of the operatives. He also mentioned individual cases of glass workers remaining at their employment at ages 70 to 80, but in the majority of instances failing eyesight at ages 50 to 60 disqualified for the employment. Thackrah's account of this occupation was, however, very superficial, and some of his conclusions were not at all in conformity to the facts as reported by other authorities. Tracy, writing in 1879, held that—

In the manufacture of glass the workmen who grind and powder the siliceous material inhale great quantities of very irritating dust, and suffer from constant hacking cough and conjunctivitis. It is rare to find a sound man among them, and they are not able to continue long at the work. According to Hirt, they should not be allowed to labor, at a stretch, more than two or three weeks, and should then work at something else, or, at any rate, give up this occupation for at least double the working time. In this way, by the use of relays, the health of the men may be sustained.[a]

Since the health-injurious effects of any given industry are, to a certain extent, measured by the proportion of those who attain to advanced ages, it is of interest to note that out of 47,245 glass workers in the United States of known ages, only 392, or 0.8 per cent, had attained to age 65 or over. The age distribution of male glass workers in the United States, according to the census of 1900, was as follows:

NUMBER AND PER CENT OF MALE **GLASS WORKERS** IN EACH AGE GROUP, COMPARED WITH NUMBER AND PER CENT OF MALES IN ALL OCCUPATIONS, 1900.

[From report of the Bureau of the Census on Occupations, 1900.]

Age.	Male glass workers.		All occupied males.	
	Number.	Per cent.	Number.	Per cent.
10 to 14 years	2,849	6.0	875,342	3.7
15 to 24 years	17,882	37.9	5,933,720	25.1
25 to 34 years	13,314	28.2	5,993,847	25.3
35 to 44 years	7,625	16.1	4,704,682	19.9
45 to 54 years	3,838	8.1	3,250,259	13.7
55 to 64 years	1,345	2.9	1,856,181	7.8
65 years or over	392	.8	1,063,856	4.5
Total	47,245	100.0	23,677,887	100.0

[a] Buck's Hygiene and Public Health, Vol. II, pp. 36, 37.

The actual numbers, as well as percentages, of glass workers at advanced ages is surprisingly small. It is evident that the rapid diminution of the number at work after age 35 must be partly, at least, the result of a high death rate at the younger ages, and in particular an excessive mortality from consumption, which at this period of life causes from one-third to one-half of the deaths from all causes. Tatham, in Oliver's Dangerous Trades, considers this employment at some length, and his observations, based largely upon English mortality data, are quoted in part as follows:

The making, blowing, and engraving of glass occupies a prominent place among unhealthy trades for several reasons. In the first place, the workers are exposed to extreme variations of temperature—in some processes, that of glass blowing especially, the operatives are constantly exposed to the intense heat of the furnace, as well as to that which radiates from the pots of molten glass which they are engaged in blowing. The intense heat and profuse sweating naturally induce painful thirst, which the workmen evidently allay by excessive drinking; this is shown by the fact that their mortality from alcoholism and from nervous disorders is nearly double that experienced by operatives in other trades. * * * The comparative mortality figure for glass makers is 1,487, and is, therefore, in excess of the average by 56 per cent. Phthisis and diseases of the respiratory system are especially fatal to workmen in this industry, and they suffer more severely than other occupied males from diseases of the circulatory, digestive, and urinary systems, as well as from cancer. Since 1881 the mortality of glass workers has increased considerably, and this is true of the younger as well as the older workers in this industry.

The English mortality statistics upon which these conclusions rest include 1,092 deaths of glass workers, and of this number 229, or 21 per cent, died from consumption. At ages 25 to 34, however, out of 177 deaths of glass workers from all causes, 79, or 44.6 per cent, were from consumption. Of the mortality from other causes, bronchitis caused 146 deaths, pneumonia 123, and other respiratory diseases 25. These combined with deaths due to consumption make a total of 523, or 47.9 per cent, from diseases of the lungs and air passages in the mortality of glass workers from all causes. The most recent English mortality statistics of glass manufacture are for the three years ending with 1902, referred to in the Supplement to the Sixty-fifth Annual Report of the Registrar-General, in part as follows:

In this occupation the death rates exceed the standard for occupied and retired males at all stages of life by proportions ranging from 12 to 32 per cent. In the main working period the comparative mortality figure is 1,260, or 25 per cent above the standard. The excess of mortality among these workers is most marked in the case of plumbism, phthisis, respiratory diseases, and Bright's disease; they

also suffer heavily from influenza and from diseases of the nervous and circulatory systems. The mortality from alcoholism, accident, and suicide, however, is below the average.

The recent English mortality statistics for glass workers are quite conclusive of the more or less unfavorable effect of this industry on health. In the table which follows the mortality from all causes among men in this group is compared with that of occupied males generally, and the result is decidedly suggestive of conditions in this trade more or less unfavorable to life and health. The excess in the general death rate of glass workers is met with at all ages, but the relative and actual excesses are greatest with advancing years, being 6.41 per 1,000 at ages 45 to 54, 10.83 at 55 to 64, and 30.99 at 65 or over.

MORTALITY FROM ALL CAUSES AMONG **GLASS WORKERS**, COMPARED WITH THAT OF ALL OCCUPIED MALES IN ENGLAND AND WALES, 1900 TO 1902, BY AGE GROUPS.

[From Part II, Supplement to the Sixty-fifth Annual Report of the Registrar-General of Births, Deaths and Marriages in England and Wales.]

Age at death.	Death rate per 1,000 for all occupied males.	Death rate for glass workers.		
		Rate per 1,000.	Greater(+) or less (−) than rate for all occupied males.	Ratio to rate for all occupied males.
15 to 19 years	2.44	3.22	+ 0.78	132
20 to 24 years	4.41	5.09	+ .68	115
25 to 34 years	6.01	6.74	+ .73	112
35 to 44 years	10.22	13.14	+ 2.92	129
45 to 54 years	17.73	24.14	+ 6.41	136
55 to 64 years	31.01	41.84	+10.83	135
65 years or over	88.39	119.38	+30.99	135

The preceding table is self-explanatory and requires no further comment. A more extended comparison is made in the next table, in which the mortality of glass workers from consumption and other respiratory diseases is compared with the normal mortality of occupied males from these diseases, by divisional periods of life. The comparison shows that the mortality from consumption is excessive at all ages, 15 to 64 inclusive, the excess being most marked at ages 35 to 54. The table further shows that the mortality of glass workers from other respiratory diseases is excessive at all ages, the excess being most marked at ages 45 or over. The two tables derived from English experience fully confirm the previous conclusion that the mortality of glass workers is excessive when comparison is made with the mortality of occupied males generally, and that this excess is largely because of the high degree of consumption frequency at

ages 25 to 54, and a high mortality from other respiratory diseases at ages 35 or over. The table which follows requires no further comment and is otherwise self-explanatory.

MORTALITY FROM CONSUMPTION AND FROM OTHER DISEASES OF THE RESPIRATORY SYSTEM AMONG **GLASS WORKERS**, COMPARED WITH THAT OF ALL OCCUPIED MALES IN ENGLAND AND WALES, 1900 TO 1902, BY AGE GROUPS.

[From Part II, Supplement to the Sixty-fifth Annual Report of the Registrar-General of Births, Deaths, and Marriages in England and Wales.]

Age at death.	Mortality from consumption.				Mortality from other diseases of the respiratory system.			
	Death rate per 1,000 for all occupied males.	Death rate for glass workers.			Death rate per 1,000 for all occupied males.	Death rate for glass workers.		
		Rate per 1,000.	Greater (+) or less (−) than rate for all occupied males.	Ratio to rate for all occupied males.		Rate per 1,000.	Greater (+) or less (−) than rate for all occupied males.	Ratio to rate for all occupied males.
15 to 19 years.....	0.54	0.56	+0.02	104	0.24	0.28	+ 0.04	117
20 to 24 years. ...	1.55	1.81	+ .26	117	.48	.60	+ .12	125
25 to 34 years.....	2.03	2.88	+ .85	142	.77	.99	+ .22	129
35 to 44 years.....	2.74	4.56	+1.82	166	1.66	2.43	+ .77	146
45 to 54 years.....	3.04	4.87	+1.83	160	3.32	5.76	+ 2.44	173
55 to 64 years.....	2.16	2.97	+ .81	138	6.54	10.75	+ 4.21	164
65 years or over...	1.11	.....	.....	.....	17.77	28.68	+10.91	161

GLASS BLOWERS.

The recorded industrial insurance mortality statistics of glass blowers include 282 deaths from all causes, of which 85, or 30.1 per cent, were from consumption. Of the mortality of glass blowers from respiratory diseases other than consumption, 17 were from pneumonia, 3 from asthma and bronchitis, and 6 from less frequent respiratory diseases. If the deaths from consumption and from other respiratory diseases are combined, 39.4 per cent of the mortality of glass blowers was from diseases of the lungs and air passages. The excess in the consumption mortality of glass blowers is still more clearly brought out in the tabular presentation of the proportionate mortality from this disease by divisional periods of life. The consumption mortality was excessive at all ages under 55, but the numbers at ages 55 or over are too small for a safe generalization. The excess in the mortality was most pronounced at ages 25 to 34, when out of every 100 deaths from all causes 56.4 were from consumption, against a normal expected proportion of 31.3. The analysis of the consumption mortality of glass blowers in detail is set forth in the table following.

PROPORTIONATE MORTALITY FROM CONSUMPTION AMONG **GLASS BLOWERS**, 1897 TO 1906, COMPARED WITH THAT OF ALL MALES IN THE REGISTRATION AREA OF THE UNITED STATES, 1900 TO 1906, BY AGE GROUPS.

[Figures for glass blowers from experience of an industrial insurance company; figures for males in registration area computed from mortality statistics of the United States census.]

Age at death.	Deaths of glass blowers, 1897 to 1906, due to—		Per cent of deaths due to consumption among—	
	All causes.	Consumption.	Glass blowers.	Males in registration area, 1900 to 1906.
15 to 24 years	24	11	45.8	27.8
25 to 34 years	78	44	56.4	31.3
35 to 44 years	59	15	25.4	23.6
45 to 54 years	55	11	20.0	15.0
55 to 64 years	26	1	3.8	8.1
65 years or over	40	3	7.5	2.7
Total	282	85	30.1	14.8

The preceding observations and statistical data confirm the conclusion that glass blowers as a class are subject to an excessive mortality from consumption, but in particular at ages 15 to 44, and this excess, in view of the conditions of labor briefly described, is in a large measure the result of health-injurious circumstances connected with the employment.

GLASS CUTTERS.

Glass cutters, including under this term all who are employed in the manufacture of crystal or so-called cut glass, constitute a separate and well-defined occupation division in glass manufacture. The most important employments are roughing, smoothing, polishing, and puttying, but of these the last named is the most injurious, chiefly because of a specific liability to lead poisoning. The sanitary aspects of the employment have received the special consideration of a British committee on dangerous trades, which, in its Third Interim Report, remarked, with special reference to the injurious effects of putty powder in the form of dust, that—

It will thus be seen that all persons employed in places where "putty powder" is used, though themselves not handling it, are liable, through inhalation of the dust, to illness and even death through juxtaposition with those engaged in its use. Under existing circumstances the wet powder splashes onto the clothes not only of the polisher who uses it, but onto those of his neighbors; it gets dry after a time, comes off in fine dust, and enters the system either by inhalation through the lungs or by swallowing or through the pores of the skin.

Among other recommendations for the amelioration of the more or less health-injurious conditions inherent in this employment, the committee suggested that all persons engaged in the department of glass cutting and powdering, where putty powder, so called, is used, should be examined once a month by the certifying surgeon for the district, who should be empowered to order temporary or permanent suspension of work.

Aside from the exposure to the inhalation of dust containing lead or other metallic ingredients, there is a further liability to the inhalation of considerable quantities of mineral dust in a large variety of forms. It would obviously be very difficult to estimate with even approximate accuracy the degree of lung injury resulting from dust exposure in glass cutting and polishing, but it is the opinion of qualified authorities that practically every branch of the trade is more or less affected, with a resulting excess in the mortality from consumption. Tracy comments briefly upon the health-injurious aspects of this occupation in part as follows:

> But the most dangerous work is that of the grinders and polishers of cut glass. About 35 per cent of them have chronic pneumonia (phthisis), and their average age at death is variously given at from 30 to 42 years. Putégnat (de Lunéville) has described a peculiar form of gingivitis which he has observed among glass cutters, and which, he says, attacks 95 out of every 100 workmen. It comes on in about three months after the person begins work, and toward the sixth month is well developed. It attacks by preference the upper jaw, and is accompanied by the same blue line that is found in cases of lead poisoning. The acid secretion of the gums destroys the enamel of the teeth, which soon become pointed, brittle, and break off close to the alveoli, leaving a permanent stump. The gums remain soft and spongy, and the breath is very fetid. At no time is there any pain or hemorrhage. He supposes it to be caused by malnutrition, bad air, etc. (Tardieu). These symptoms certainly appear suspiciously like those of lead poisoning, and the suspicion is rendered stronger by the fact that French flint glass contains about 20 per cent of lead, and that other symptoms of lead poisoning are not uncommon in glass cutters, as colic, constipation, muscular pains, etc. Garrod has noticed the frequency of gout among them, and brings it forward to support his theory of a connection between that disease and saturnine poisoning.
>
> The grinding or etching of glass by the sand blast fills the rooms with a dust composed of particles of sand and glass mingled. The business is a comparatively new one, and the workmen so far do not appear to be injured by it, with the exception of a slight tickling cough when they first begin work. The dust is rather coarse and heavy, and I am inclined to think it does not penetrate very far into the lungs, perhaps not even getting beyond the trachea, whence it is easily expectorated.

Lloyd also considered this employment, holding that—

Flint glass contains lead, being chemically a compound of silicon (silicic acid) with an alkaline and an earthy base, the latter being represented by lead. It is this flint, or lead, glass that is used for cut glass because of its brilliancy. The glass cutter's mill is a revolving disk of wrought or cast iron on which is fed a mixture of sand and water, with which the cutting and polishing are accomplished. In this process, which requires the artisan to bend closely over his mill, dust and fine particles of glass are given off. Emery and putty powder also are used, the latter containing lead. These are the noxious agents by which these cutters and polishers of flint glass acquire lead poisoning.

There are, unfortunately, no official vital statistics of this occupation, since the comparatively small group of cutters of crystal glass is included in the census vital statistics with glass workers generally. Cutters of crystal glass are continuously and considerably exposed to the inhalation of fine particles of mineral dust, which must indeed disastrously affect the lungs of the workmen, but in particular such as are otherwise predisposed to consumption. The suggestion of Oliver and others that crystal glass polishers and cutters should be periodically medically examined for cases of lead poisoning applies equally to the purpose of discovering incipient cases of tuberculosis more or less the result of the employment.[a]

The recorded industrial insurance mortality statistics of glass cutters include 116 deaths from all causes, of which 40, or 34.5 per cent, were from consumption. Of the mortality of glass cutters from respiratory diseases, other than consumption, 12 were from pneumonia, 1 from asthma, and 2 from less frequent respiratory diseases. The numbers are rather small for a safe generalization, but if the deaths from consumption and from respiratory diseases other than consumption are combined 47.4 per cent of the mortality of glass cutters was from diseases of the lungs and air passages. The excess in the consumption mortality of glass cutters is more clearly brought out in the tabular presentation of the proportionate mortality from this disease by divisional periods of life. While the consumption mortality was excessive at all ages under 55, the numbers being too small for definite conclusions for older ages, the excess was most pronounced at ages 25 to 34, when out of every 100 deaths from all causes 46.7 were from consumption, against a normal expected proportion of 31.3.

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[a] For additional references to the health-injurious circumstances in glass cutting and polishing, see the Reports of the Chief Inspector of Factories and Workshops for 1895, Vol. I, p. 36; 1896, p. 25; 1899, pp. 16, 313; 1900, p. 207; 1901, Part I, p. 220. For a descriptive account of the various manufacturing processes, see Scientific American for April 30, 1904.

PROPORTIONATE MORTALITY FROM CONSUMPTION AMONG GLASS CUTTERS, 1897 TO 1906, COMPARED WITH THAT OF ALL MALES IN THE REGISTRATION AREA OF THE UNITED STATES, 1900 TO 1906, BY AGE GROUPS.

[Figures for glass cutters from experience of an industrial insurance company; figures for males in registration area computed from mortality statistics of the United States census.]

Age at death.	Deaths of glass cutters, 1897 to 1906, due to—		Per cent of deaths due to consumption among—	
	All causes.	Consumption.	Glass cutters.	Males in registration area, 1900 to 1906.
15 to 24 years	26	7	26.9	27.8
25 to 34 years	30	14	46.7	31.3
35 to 44 years	27	11	40.7	23.6
45 to 54 years	20	5	25.0	15.0
55 to 64 years	8	1	12.5	8.1
65 years or over	5	2	40.0	2.7
Total	116	40	34.5	14.8

The preceding observations and statistical data confirm the conclusion that glass cutters as a class are subject to an excessive mortality from consumption, but in particular at ages 15 to 44, and this excess, in view of the conditions of labor briefly described, is in a large measure the result of health-injurious circumstances connected with the employment.

DIAMOND CUTTERS.

Diamond cutting, although an employment of rather limited extent in the United States, is of interest and importance as an occupation with exposure to mineral dust. Hand cutting is very rare and machine cutting is at the present time the general rule in the trade, as carried on under American conditions. There has been a decided improvement as the result of the active efforts of the Diamond Polishers' Union, which has a membership of about 400 in New York City alone. The occupation has the advantage of being well paid, at least in many individual instances, and some of the cutters are reported to receive as much as $80 and polishers as much as $60 a week.

The process of diamond cutting and polishing consists of two parts. After the stone has been cut it is taken to the polishing room, where the setter selects a suitable sized brass cup, called a dope, fills it with a mixture of lead and tin and melts it in a gas flame. After working the solder to its proper shape, he places the diamond in the center, leaving only a very small part exposed. A mark is made on the solder before it becomes fairly set, and then the stone is passed on to the polisher. By the mark made on the solder the latter knows at once the exact run of the grain and the way it will polish to the best advantage. The polisher uses a circular disk composed of very

porous iron, so that as the diamond is polished away in the form of dust it enters the pores of the iron, the result being that diamond cuts diamond.

According to Hirt, the first-mentioned process is exceedingly unhealthful. The bent position of the workman, the heat, and the danger of lead poisoning all contribute to make the occupation an unhealthful one. The principal bad features of the second process are the dust inhalation and the straining of the eyes. While very little dust escapes into the air, the little, according to Hirt, is very bad in its effects, as the particles are angular, sharp, and, of course, very hard.

Arlidge in his observations upon the diamond cutter's trade remarks, however, that—

From our own observation of diamond cutting and polishing we can scarcely imagine any definite morbid result from the dust of the gem. It is far too precious to fritter away into dust by any coarse grinding likely to give off a tangible quantity of this substance, and we suspect that the recorded ill health of diamond workers is chiefly attributable to accidental circumstances connected with the charcoal furnaces formerly used; to overheated and badly ventilated workshops, and to dissipated habits among the employees. So far as diamond dust may possibly be thrown off in the polishing process, so far, doubtless, would it be an irritant to the respiratory organs by reason of the very sharp and angular character of its atoms.

The employment is divided into cutters, splitters, and polishers. In Amsterdam, the chief center of the industry, some 9,000 persons are employed, according to a report by United States Consul Hill. The hygienic conditions of the trade in Amsterdam, however, are apparently less satisfactory than in the United States. The principal factors detrimental to health result from the use of tin and lead as an alloy, and a prize has been offered by the Dutch Government for a nonpoisonous composition, but thus far the requirements governing the award of the prize appear not to have been complied with. Tracy comments upon the sanitary aspects of the employment as follows:

In diamond cutting the amount of dust created is small, and yet the occupation is a very injurious one. The "setter" prepares the diamond for the cutter by soldering it on the end of a copper rod with an alloy of 4 parts lead to 1 of tin. He does this with a charcoal fire, and is exposed to great heat, as well as to poisonous gases. The setters suffer from headache, tinnitus aurium, impaired digestion, and irregularity of the bowels. In Coster's factory, at Amsterdam, 73½ per cent of them were pale and emaciated, 57 per cent had palpitation, giddiness, præcordial distress, 56 chronic headache, 36 asthma, etc. The use of solder produces lead poisoning. Out of 90 examined, 30 showed traces of poisoning. In general, they are all sick men, and suffer from lung troubles. Nine per cent had phthisis. The cutters or polishers grind the gems on iron wheels covered with

diamond dust and oil. The dust inhaled by them, though small in quantity, is enough to cause frequent chronic lung troubles. In Coster's factory, 52 per cent of them were thin and pale, 40 per cent asthmatic, 33.75 suffered from headaches, etc.

No American vital statistics of this occupation have been published, but the occupation is evidently one which requires to be classified among unhealthy trades and in which the degree of consumption frequency is the result, more or less, of the continuous and considerable inhalation of mineral dust.

POTTERS.

The pottery industry includes the manufacture of earthenware, china, and porcelain. It always has been recognized as one of the unhealthiest of trades, but the health-injurious effects vary widely according to particular employments. The most seriously exposed are the dippers, flint-mill workers, ground layers, mixers, scourers, and sweepers. In all of these employments except the first the exposure to health-injurious mineral dust constitutes a serious menace to health. In the case of dippers the liability to dust inhalation is modified and increased in seriousness by the risk of lead poisoning. The degree of dust exposure is also very serious in the case of kilnmen, mold makers, placers, pug-mill workers, sagger makers, and slip makers. In the aggregate the industry gives employment in the United States to about 16,000 persons, of whom one-fifth are women. The sanitary conditions of the trade have often been investigated, and the most recent evidence is to the effect that there have been material improvements within the last few decades. The most careful and useful observations of the industry were made by Arlidge, who for many years lived in the Staffordshire pottery district of England. Before quoting Arlidge the fact may be briefly referred to that as early as 1705 Ramazzini, in commenting upon the diseases of potters, pointed out that "not all who go by the name of potters are subject to the particular diseases of the trade," and that discrimination was necessary in the medical treatment of the different classes of employees. Ramazzini made a curious observation bearing upon the question of eye strain, which has only received qualified consideration within recent years, stating, with reference to potters, that "those who sit at the wheel and form the vessels by turning it about with their feet are apt to have a swimming in the head if their eyes are otherwise weak."

Arlidge, in discussing the effects of mineral dust in the manufacture of pottery before the Sanitary Institute in 1893, remarked at the outset that—

Scarcely any other manufacture has so strong a claim upon the attention of sanitarians as has that of pottery. It stands nearly at the

head of the list of unhealthy occupations, and exercises its pernicious effects almost wholly upon the respiratory organs, by production of bronchitis and of consumption. Thus it is found that while workmen engaged in other employments have a mortality from chest diseases of 7.86 per cent, potters exhibit one of 12.29 per cent. Likewise with respect to phthisis—nonpotters present one of 9.27 and potters one of 12.90.

After describing the various processes of manufacture and their relation to health-injurious circumstances, Arlidge discussed the relation of silica dust and its irritating effects upon the mucous membrane and epithelium of the lungs, holding the opinion that—

Clinical observation abundantly confirms this fact. For a considerable time the inhaled dust is arrested in its advance toward the lung tissue proper by the mucous secretion in the bronchial tubes, and by the expulsive energy of the cilia lining of those tubes. But at length these resistant forces weaken before the constant entry of fresh dust, and in course of time the noxious material passes into the lymph channels, and also along the finer bronchi, until it reaches the intimate structure and the air cells themselves. Here as a foreign substance it sets up inflammatory action; lymph cells spring up, the air vesicles become choked with inflammatory products, the tissue around them gets indurated (lung sclerosis), and useless as breathing tissue.

The history of these pathological changes is reflected in the symptoms exhibited by the sufferers. In the primary stage little inconvenience is felt; there arises a desire to clear the throat of some impeding mucus at the end of the day's work, or upon transition to the outer air from the warm shop, and especially on rising in the morning. This expulsive act soon develops into a cough, and relief is obtained by the expectoration of more or less blackish viscid mucus. Presently there is a feeling of tightness in the chest, and the breathing grows less free and full. As time goes on these signs of disturbed lung function become more pronounced, and in the end the patient grows asthmatic—a victim of potter's asthma.

Until this advanced stage of disorder is reached, it is singular to notice how little attention and anxiety are bestowed upon the pulmonary derangements. This is because the general health is, for the most part, not seriously affected, and inasmuch as while the sufferer breathes a warm air in his workshop or home, his lung trouble is felt as little more than an annoyance; or as something which is to be taken as a matter of course, and like his wages, as an unavoidable incident of his calling.

As with chronic maladies at large, so with potter's bronchitis and asthma; the tendency is to grow worse and the lung lesion to extend, and soon the damaged respiration reacts upon the whole frame; the sufferer can not get proper outdoor exercise, his appetite fails, his sleep is broken, the expectoration augments and grows muco-purulent, the body wastes slowly, while the increased effort to breathe entails strain upon the heart, leading not infrequently to disease of that organ, with the after consequences in the shape of dropsical effusions.

We now have before us the fully developed disease known as potter's consumption or potter's asthma.

The injurious effects of silica dust in the pottery industry are materially increased by minute particles of flint, and a further factor injurious to health is the extensive use of plaster of Paris, employed in the making of molds and models. According to Arlidge, the effects of plaster of Paris dust, however, are not apparently as serious as the very destructive effects of silica dust and small particles of flint. He draws attention to the necessity of an efficient system of ventilation as the only means by which material improvements can be brought about.

The health-injurious effects of lead, extensively used in potteries, which do not properly fall within the present discussion, must here be passed over. It is true, of course, that a considerable amount of lead dust is inhaled, but the effects are rather upon the system generally than upon the lungs. The observations of Arlidge are so entirely sustained by other qualified observers that it is not necessary to further enlarge upon the sanitary aspects of this trade. The evidence, statistical or otherwise, is conclusive that potters as a class suffer more, perhaps, from phthisis and other diseases of the lungs than employees in any other occupation, and their mortality from bronchitis and other respiratory diseases is many times as high as the mortality of occupied males generally, but it has been pointed out by Tatham, in his contribution to Oliver's Dangerous Trades, that—

> Potters succumb to nontubercular disease of the lungs much more rapidly than they do to tubercular phthisis; and it is certain that much of the so-called potter's phthisis ought properly to be termed cirrhosis of the lung. Deaths from this affection should never be included under the head of phthisis, which term is now restricted, by universal consent, to the tubercular malady of that name.

It is also necessary to keep in mind, in discussing the pottery industry, that it divides itself broadly into two principal departments—that is, first, the making of the articles from potter's clay, and, second, their ornamentation by painting, gilding, etc. The latter group is usually defined as decorators, and sometimes as printers, and because of this fact many errors occur in occupation statistics as the result of erroneous classification—not based upon the industry as such, but upon the specific title of the employment.

One of the most health-injurious employments in the industry is that of the brushing, or dusting off, of the ware after it is taken from the kilns. Oliver, in discussing at length the sanitary aspects of china and earthenware manufacture and in particular potter's asthma and consumption, draws special attention to this process as observed in the porcelain potteries at Limoges. He states that—

> The brushing off or époussetage of the fired or biscuited ware is done both by women and men by means of soft feather brushes. It

is a very dusty operation, and where there are no fans for its removal, as in some of the factories I visited, the air was thick with dust. The windows were open at the time, but currents of air obtained by this means exercised no very appreciable influence upon the dust. It is not this kind of ventilation that is required under these circumstances. In the matter of the provision of artificial means for the removal of dust and the renewal of air in the potteries of Limoges, some of the manufacturers seemed to me to be rather behind than in advance of the owners of large factories in Staffordshire. Accordingly I was not unprepared for the information that among the potters, especially the brushers off or scourers, in Limoges, the mortality from pulmonary consumption and chest diseases is high. The harmful operations in porcelain works are the emptying of the kilns, the removal of the ware from the saggers and the brushing of this ware, while the hard dust that rises during the polishing of the all but finished articles is equally dangerous. The polishing has for its object the removal of any roughness from the edges or surfaces of the ware, and it is generally done on a revolving wheel by means of a broken piece of china, the workman using this as a smoothing agent. The men and women employed in these operations are usually well covered with dust, yet it is seldom that they wear respirators. Fans for the removal of the dust were present in only very few of the factories. The employees objected to them on the ground that they created a strong draft of cold air. Doctor Raymondaud, one of the professors in the School of Medicine, Limoges, has made a special study of the diseases of porcelain makers, particularly of pulmonary consumption and chronic bronchitis. He found that the potteries furnished a larger number of patients suffering from lung diseases than did the other trades of the district. Of 75 deaths registered in Limoges as occurring among china makers, 36 were due to phthisis, and of 30 potters whom Raymondaud examined, 20 were suffering from pulmonary consumption. Pulmonary phthisis is regarded as the principal disease affecting the workers in the Limoges potteries.

The most recent English mortality statistics of potters are for the three years ending with 1902, referred to in the Supplement to the Sixty-fifth Annual Report of the Registrar-General, in part as follows:

Between the ages 20 and 35 years the mortality of potters falls below that of occupied and retired males generally; at every other age, however, it shows an excess which amounts to no less than 74 per cent at ages 45 to 55 years, and to 66 per cent at ages 55 to 65 years. In the main working time of life the comparative mortality figure is 1,493, or 49 per cent above the standard. The principal excess falls under the head of respiratory diseases, for which the mortality figure is 473, or nearly thrice the standard. There is also a considerable excess in the mortality from phthisis, from nervous and circulatory diseases, and from suicide. These workers are also specially liable to lead poisoning, but from accident as well as from influenza, Bright's disease, and alcoholism their mortality is low.

In the last decennial supplement the mortality of potters was described as enormous. From the present report, however, it will be seen that since 1890–1892 their mortality has declined at every stage

of life; and in the main working period the comparative mortality figure has fallen from 1,970 to 1,420, or by no less than 28 per cent. It is satisfactory to note that in the recent period the mortality of potters from plumbism has fallen to less than half its former amount, while there has also been a substantial decline under most other headings; the mortality from respiratory and urinary diseases having fallen by about one-third, that from phthisis, nervous and digestive diseases by about one-fourth, and that from circulatory diseases by about one-fifth part. Potters, however, now fall victims in increased proportion to accident, and to suicide, and the mortality from cancer has increased by more than half. Since 1860, 61, 71 the death rates of potters both above and below 45 years of age have fluctuated somewhat, but the recent modified mortality figure is by far the lowest on record. Since 1880–1882 there has been a continuous decline of mortality from phthisis, from liver disease, and from diseases of the nervous and digestive systems.

The English statistics for potters are quite conclusive of the unfavorable effects of this industry on health. In the table which follows the mortality from all causes among potters is compared with that of occupied males generally, and the result is decidedly suggestive of conditions more or less unfavorable to life and health, but in particular at ages 35 or over, when the mortality rate from all causes exceeds by from 4.30 to 29.86 per 1,000 the corresponding mortality of occupied males generally.

MORTALITY FROM ALL CAUSES AMONG **POTTERS**, COMPARED WITH THAT OF ALL OCCUPIED MALES IN ENGLAND AND WALES, 1900 TO 1902, BY AGE GROUPS.

[From Part II, Supplement to the Sixty-fifth Annual Report of the Registrar-General of Births, Deaths, and Marriages in England and Wales.]

Age at death.	Death rate per 1,000 for all occupied males.	Death rate among potters.		
		Rate per 1,000.	Greater (+) or less (−) than rate for all occupied males.	Ratio to rate for all occupied males.
15 to 19 years	2.44	2.62	+ 0.18	107
20 to 24 years	4.41	3.68	− .73	83
25 to 34 years	6.01	5.26	− .75	88
35 to 44 years	10.22	14.52	+ 4.30	142
45 to 54 years	17.73	31.64	+13.91	178
55 to 64 years	31.01	54.15	+23.14	175
65 years or over	88.39	118.25	+29.86	134

The preceding table is self-explanatory and requires no further comment. A more extended comparison, however, is made in the next table, in which the mortality of potters from consumption and from other diseases of the respiratory system is compared with the normal mortality of occupied males from these diseases, by divisional periods of life. The comparison shows that the mortality from consumption among potters is decidedly excessive at ages 35 to 64 by 1.05 to 4.10 per 1,000. Still more marked is the excess in the mortality from respira-

tory diseases other than consumption among potters at ages 35 or over, which varies from 1.63 to 17.27 per 1,000. The table which follows requires no further comment and is otherwise self-explanatory:

MORTALITY FROM CONSUMPTION AND FROM OTHER DISEASES OF THE RESPIRATORY SYSTEM AMONG **POTTERS**, COMPARED WITH THAT OF ALL OCCUPIED MALES IN ENGLAND AND WALES, 1900 TO 1902, BY AGE GROUPS.

[From Part II, Supplement to the Sixty-fifth Annual Report of the Registrar-General of Births, Deaths, and Marriages in England and Wales.]

Age at death.	Mortality from consumption.				Mortality from other diseases of the respiratory system.			
	Death rate per 1,000 for all occupied males.	Death rate for potters.			Death rate per 1,000 for all occupied males.	Death rate for potters.		
		Rate per 1,000.	Greater (+) or less (−) than rate for all occupied males.	Ratio to rate for all occupied males.		Rate per 1,000.	Greater (+) or less (−) than rate for all occupied males.	Ratio to rate for all occupied males.
15 to 19 years.....	0.54	0.62	+0.08	115	0.24	0.46	+ 0.22	192
20 to 24 years.....	1.55	1.34	− .21	86	.48	.58	+ .10	121
25 to 34 years.....	2.03	2.00	− .03	99	.77	.64	− .13	83
35 to 44 years.....	2.74	3.79	+1.05	138	1.66	3.29	+ 1.63	198
45 to 54 years.....	3.04	7.14	+4.10	235	3.32	10.78	+ 7.46	325
55 to 64 years.....	2.16	4.37	+2.21	202	6.54	23.10	+16.56	353
65 years or over...	1.11	.97	− .14	87	17.77	35.04	+17.27	197

With further reference, however, to the excessive mortality from respiratory diseases among potters, which, as subsequently to be shown, is confirmed by industrial insurance mortality experience, reference may be made to the discussion of the occurrence of potters' asthma, in the Report of the Departmental Committee on Industrial Diseases. The evidence submitted to the committee disclosed a decided improvement in the disease liability of potters to the fibroid form of phthisis, based upon the records of the North Staffordshire Infirmary, at Stoke-upon-Trent, covering the period 1873–1906. Upon a basis of 10,000 patients, the number of cases of fibrosis of the lungs was found to have been 145 during the six years ending with 1878, 107 during the six years ending with 1897, and only 4 during the six years ending with 1906.(a) In the opinion of a qualified medical witness, the diminution was not the result of a difference in the practice of diagnosing, but a real reduction in the prevalence of the disease. The improvement in the disease liability was attributed to a betterment in the conditions of work and a more effective method of factory supervision, inspection, and control. Aside from these favorable conclusions, however, the general mortality statistics of this trade indicate continued unfavorable circum-

[a] Minutes of Evidence, Departmental Committee on Compensation for Industrial Diseases, p. 60.

stances, reflected in the decidedly excessive degree of consumption frequency and a correspondingly excessive mortality from other respiratory diseases in the more advanced years of life.

The recorded industrial insurance mortality statistics of potters include 384 deaths from all causes, of which 127 or 33.1 per cent were deaths from consumption. Of the mortality of potters from respiratory diseases other than consumption, 21 were deaths from pneumonia, 18 from asthma, 12 from bronchitis, and 6 from less frequent respiratory diseases. If the deaths from consumption and from other respiratory diseases are combined, 47.9 per cent of the mortality of potters was found to be from diseases of the lungs and air passages. The excess in the consumption mortality of potters is still more clearly brought out in the tabular presentation of the proportionate mortality from this disease by divisional periods of life. While the consumption mortality was excessive at all ages, the excess was most pronounced at ages 25 to 34, when out of every 100 deaths from all causes, 52.9 were from consumption, against an expected normal proportion of 31.3. The analysis in detail of the consumption mortality of potters is set forth in the table below:

PROPORTIONATE MORTALITY FROM CONSUMPTION AMONG **POTTERS**, 1897 TO 1906, COMPARED WITH THAT OF ALL MALES IN THE REGISTRATION AREA OF THE UNITED STATES, 1900 TO 1906, BY AGE GROUPS.

[Figures for potters from experience of an industrial insurance company; figures for males in registration area computed from mortality statistics of the United States census.]

Age at death.	Deaths of potters, 1897 to 1906, due to—		Per cent of deaths due to consumption among—	
	All causes.	Consumption.	Potters.	Males in registration area, 1900 to 1906.
15 to 24 years	46	11	23.9	27.8
25 to 34 years	68	36	52.9	31.3
35 to 44 years	84	37	44.0	23.6
45 to 54 years	78	22	28.2	15.0
55 to 64 years	72	14	19.4	8.1
65 years or over	36	7	19.4	2.7
Total	384	127	33.1	14.8

Since potters are liable to an excessive mortality not only from consumption, but also from respiratory diseases generally, the analysis of the industrial insurance mortality experience has been extended to respiratory diseases other than consumption, and the number of deaths from such diseases, by divisional periods of life.

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PROPORTIONATE MORTALITY FROM DISEASES OF THE RESPIRATORY SYSTEM OTHER THAN CONSUMPTION AMONG **POTTERS**, 1897 TO 1906, COMPARED WITH THAT OF ALL MALES IN THE REGISTRATION AREA OF THE UNITED STATES, 1900 TO 1906, BY AGE GROUPS.

[Figures for potters from experience of an industrial insurance company; figures for males in registration area computed from mortality statistics of the United States census.]

Age at death.	Deaths of potters, 1897 to 1906, due to—		Per cent of deaths due to respiratory diseases other than consumption among—	
	All causes.	Respiratory diseases other than consumption.	Potters.	Males in registration area, 1900 to 1906.
15 to 24 years	46	1	2.2	9.7
25 to 34 years	68	8	11.8	10.9
35 to 44 years	84	10	11.9	12.5
45 to 54 years	78	18	23.1	12.6
55 to 64 years	72	17	23.6	12.2
65 years or over	36	1	2.8	11.6
Total	384	[a] 57	14.8	11.8

[a] Including 2, age unknown.

While respiratory diseases have been grouped for purpose of convenience, and on account of the comparatively small number of deaths under consideration, the returns in detail disclose the fact that it is particularly in the number of deaths from asthma that potters experience a higher mortality than occupied males generally.

In summarizing these rather extended observations and statistical data, including insurance mortality experience, the conclusion is confirmed that potters as a class are decidedly subject to a high mortality from consumption and from respiratory diseases other than consumption.

CEMENT WORKERS.

The health-injurious conditions of cement-making processes are quite well understood, being on the one hand the dust, and on the other hand noxious vapors arising through the process of burning. The vapors are probably more obnoxious than injurious, but the subject attracted sufficient attention to suggest an investigation by the Royal Commission on Noxious Vapors, in 1878. As a result of the vapors and the dust generated during the processes, cement works, as a rule, are located outside of large cities.

The health conditions in cement works have never been fully investigated, but it appears to be the consensus of opinion that the effects are not as serious as assumed upon the facts of a casual inspection. Fatal accidents have occurred as the result of asphyxiation by carbon-monoxide gas, but such cases are very rare. Cases of gassing, so-called, which do not terminate fatally, are comparatively common. Arlidge considered the employment of cement making at some length,

pointing out that the workmen are exposed to dust in an intense form, but the experience would seem to prove that the effect on health is not as serious as expected. He states that the raw materials of cement are clay with flint and lime, and he briefly describes the process of manufacture as follows:

After the materials have been well mixed and ground together in a sort of mortar mill to the consistency of liquid mud, the next business is to drive off the water by heat, and then to subject the dried substance in tins to a still higher temperature. Later all the cement is withdrawn and then ground between rollers to the requisite fineness. The primary mixing and grinding, being done with a free supply of water, exhibits no unsanitary conditions. In working the kilns the workmen suffer from great heat and dust, but the most continuous dusty work is in the mill, the air of which is clouded with cement. Inquiry among the workmen elicited the fact that after a while they become short of breath and suffer cough, though not in a high degree, and that on arising in the morning they had to clear their chests by expectorating viscid mucus containing cement dust.

The amount of dust generated in cement-making processes is enormous. The workmen take practically no precaution to avoid this dust, and considerable quantities are of necessity inhaled. It is very rare to find employees who use a respirator or even a piece of ordinary cloth to provide some protection against the health-injurious conditions which surround them. The conditions are probably at their worst in the sacking or packing department, where such precautions are occasionally adopted. Every department, however, is filled with dust, and the avoidance of its inhalation by the majority of employees is under present methods practically impossible. The disease problem is complicated by a high degree of temperature in some of the departments, in particular at the kilns. While many descriptive accounts of the industry have been published, the hygiene of the occupation has been practically ignored. Tracy refers to it very briefly, holding that "the workmen who make Portland cement are greatly troubled by the dust, caused by shoveling the mass into sacks after it has been burned and ground. They have a persistent cough, and expectorate little lumps of cement. They find it impossible to continue this part of their labor day after day, and are obliged to take intervals of rest."

Parry, in his treatise on The Risks and Dangers of Various Occupations, refers to cement workers as follows:

Those engaged in the manufacture and use of Portland cement are very liable to get the dust into their lungs. Portland cement is made from some substance containing carbonate of lime, such as white chalk, existing in such immense quantities in this country, and some material containing silica and alumina, such as a selected clay,

or alluvial mud. These are ground together with water to a muddy consistency, which is then dried by heating in chambers. This being a wet process no dust is raised, but during the next stage, the digging out of the cement, a great deal of dust is created. The material raised is then calcined, ground between rollers, and finally packed in bags. In the last two operations, the grinding and packing, much dust is also scattered. The particles are of a sharp, irritating character, and therefore dangerous.

In Oliver's Dangerous Trades, the manufacture of cement from a hygienic point of view is briefly discussed and illustrated by a microphotograph of cement dust by Migerka. Oliver's description is as follows:

Under the microscope are seen a few sharp-edged little plates and amorphous masses like small clumps. The particles are not of themselves so dangerous as might at first sight appear. Although cement workers suffer from pulmonary disease, they do not do so to the great extent that might be expected. Probably the harmful effects are largely due to the hygroscopic character of the particles and their alkaline reaction.

There are no official vital statistics of this employment for the United States or for England and Wales. The recorded industrial insurance mortality statistics of cement workers include only 88 deaths from all causes, of which 17, or 19.3 per cent, were deaths from consumption. Of the mortality of cement workers from other respiratory diseases, 5 were from pneumonia and 3 from other diseases of that class. If the deaths from consumption and from other respiratory diseases are combined, it is found that 28.4 per cent of the mortality of cement workers was from diseases of the lungs and air passages. The excess in the consumption mortality of cement workers is more clearly brought out in the tabular presentation of the proportionate mortality from this disease by divisional periods of life:

PROPORTIONATE MORTALITY FROM CONSUMPTION AMONG **CEMENT WORKERS,** 1897 TO 1906, COMPARED WITH THAT OF ALL MALES IN THE REGISTRATION AREA OF THE UNITED STATES, 1900 TO 1906, BY AGE GROUPS.

[Figures for cement workers from experience of an industrial insurance company; figures for males in the registration area computed from mortality statistics of the United States census.]

Age at death.	Deaths of cement workers, 1897 to 1906, due to—		Per cent of deaths due to consumption among—	
	All causes.	Consumption.	Cement workers.	Males in registration area, 1900 to 1906.
15 to 24 years	10	1	10.0	27.8
25 to 34 years	12	3	25.0	31.3
35 to 44 years	19	4	21.1	23.6
45 to 54 years	15	6	40.0	15.0
55 to 64 years	19	3	15.8	8.1
65 years or over	13	.....	.....	2.7
Total	88	17	19.3	14.8

The foregoing observations confirm the conclusion that cement makers as a class are subject to conditions more or less injurious to health, but the evidence is as yet inconclusive that these conditions predispose to an excessive mortality from consumption.(a)

PLASTERERS.

The building trades are all more or less exposed to the inhalation of mineral dust, the injurious effects of which are probably most severe in the case of plasterers, masons, and allied occupations. This group of occupations is not clearly defined, since many plasterers are also masons, or bricklayers, while others are whitewashers or paper hangers. The English vital statistics combine plasterers, whitewashers, and paper hangers.

The health conditions in this trade were commented upon by Ramazzini, who, in the quaint language of the day, states that "Lime and Plaister are likewise offensive to those who burn them or handle them, or sell them," and he continues: "I have frequently observed that those who boil, prepare, grind, sift, or sell it, do usually labor under a difficulty of breathing." As a safeguard, Ramazzini points out that: "Though such workmen have a cover for their mouth, they can not avoid receiving the flying particles at the mouth and nose, upon which these particles enter the passages of respiration and mix with the lymph, rise up in hard, chalky concretions, or by daubing the winding passages of the lungs intercept freedom of breath. I found," he observes, "that such as continued in this business did die asthmatic and cachetik." He refers also to a still earlier author, Morton, who connected the inhalation of the dust with consumption of the lungs. He concludes his observations with the statement that: "Care must be taken to observe the caution laid down above, with intent to guard the mouth as much as possible from receiving the offensive particles." All this was written more than two hundred years ago.

(a) How widely qualified opinions differ with regard to the health-injurious effects of mineral dust derived from lime and cement is made evident by the following quotation from the Journal of the American Medical Association, December 12, 1908:

Selkirk has investigated a general opinion among lime workers that they are exceptionally free from bronchitis and pulmonary tuberculosis. He was unable to find an instance of phthisis among them, nor could he learn on inquiry of any worker in limekilns having died from tuberculosis. He asks whether those who inhale and swallow much lime are abnormally free from tuberculosis of the lungs. He discusses what is known of the therapeutics of calcium salts, and says it appears that the continued absorption of calcium from the lungs and intestines might maintain an abnormally high percentage of it in the blood. He suggests that the workingman predisposed to tuberculosis might turn his attention to lime and cement working as an occupation, and even hints at the organization of lime works as a curative tuberculosis colony. A rapid increase of weight is commonly observed in new workers at the Warren Cement Works at Hartlepool.

Thackrah, writing in 1832, took a more favorable view of the employment, holding that bricklayers and their laborers, while particularly exposed to lime dust, suffered from diseases of the eye and cutaneous eruptions, but not from internal disease, and he quotes an adage common to the workmen in the trade of the period, that "bricklayers and plasterers' laborers, like asses, never die." Regarding plasterers and whitewashers, who are also exposed to lime dust, he states: "They suffer from no sensible injury," and that "they are more pallid and less robust than bricklayers." Thackrah, however, did not sustain his observations by trustworthy data.

In Rhode Island during the ten years ending with 1906, the number of recorded deaths of plasterers from all causes was 25, and of this number 5, or 20 per cent, were from consumption, and 4, or 16 per cent, from other respiratory diseases. Of the total mortality 9, or 36 per cent, were from diseases of the lungs and air passages.

The most recent English mortality statistics of plasterers and paper hangers are for the three years ending with 1902, referred to in the Supplement to the Sixty-fifth Annual Report of the Registrar-General, in part as follows:

> Between the ages of 35 and 65 years the death rate in this industry exceeds the standard for occupied and retired males, while at ages outside these limits the rates are below it. In the main working period of life the comparative mortality figure is 1,018, or within 1 per cent of the standard. The mortality from alcoholism and liver disease, from phthisis, from respiratory diseases, and from cancer, slightly exceeds the standard, and except that these workers appear to suffer but little from influenza, the figures for other diseases agree closely with the average.

The English occupation mortality statistics for plasterers are somewhat impaired in value by the fact that paper hangers and whitewashers are combined with this occupation, but the statistics may safely be accepted as indicating with approximate accuracy the specific disease liability of men in this employment to consumption and respiratory diseases. In the table which follows the mortality from all causes among men in this group is compared with that of occupied males generally, and the result is rather suggestive of conditions in this trade more or less unfavorable to life and health. The excess in the general mortality is most marked at ages 35 to 64, when the death rate of plasterers from all causes exceeds the mortality of occupied males generally by from 1.30 to 1.52 per 1,000. The mortality of plasterers, however, is below the average at ages under 35, and at 65 years or over.

MORTALITY FROM ALL CAUSES AMONG **PLASTERERS, PAPER HANGERS, AND WHITEWASHERS,** COMPARED WITH THAT OF ALL OCCUPIED MALES IN ENGLAND AND WALES, 1900 TO 1902, BY AGE GROUPS.

[From Part II, Supplement to the Sixty-fifth Annual Report of the Registrar-General of Births, Deaths, and Marriages in England and Wales.]

Age at death.	Death rate per 1,000 for all occupied males.	Death rate for plasterers, paper hangers, and whitewashers.		
		Rate per 1,000.	Greater (+) or less (−) than rate for all occupied males.	Ratio to rate for all occupied males.
15 to 19 years	2.44	1.52	− 0.92	62
20 to 24 years	4.41	3.44	− .97	78
25 to 34 years	6.01	4.07	− 1.94	68
35 to 44 years	10.22	11.52	+ 1.30	113
45 to 54 years	17.73	19.18	+ 1.45	108
55 to 64 years	31.01	32.53	+ 1.52	105
65 years or over	88.39	72.18	−16.21	82

The preceding table is self-explanatory and requires no further comment, except that it confirms the view that the health-injurious effects of this employment are not as pronounced as in many other dusty trades, but in particular such occupations as stonecutting, pottery manufacture, glass blowing, etc. In the table which follows the mortality of plasterers from consumption is compared with the normal mortality of occupied males from this disease by divisional periods of life. The comparison shows that the mortality from consumption is above the normal at ages 35 or over, but it is only at ages terers is set forth in detail in the table below:

MORTALITY FROM CONSUMPTION AMONG **PLASTERERS, PAPER HANGERS, AND WHITEWASHERS,** COMPARED WITH THAT OF ALL OCCUPIED MALES IN ENGLAND AND WALES, 1900 TO 1902, BY AGE GROUPS.

[From Part II, Supplement to the Sixty-fifth Annual Report of the Registrar-General of Births, Deaths, and Marriages in England and Wales.]

Age at death.	Mortality from consumption.			
	Death rate per 1,000 for all occupied males.	Death rate for plasterers, paper hangers, and whitewashers.		
		Rate per 1.000.	Greater (+) or less (−) than rate for all occupied males.	Ratio to rate for all occupied males.
15 to 19 years	0.54	0.41	−0.13	76
20 to 24 years	1.55	1.06	− .49	68
25 to 34 years	2.03	1.22	− .81	60
35 to 44 years	2.74	3.98	+1.24	145
45 to 54 years	3.04	3.62	+ .58	119
55 to 64 years	2.16	4.01	+1.85	186
65 years or over	1.11	1.53	+ .42	138

The recorded industrial insurance mortality statistics of plasterers include 577 deaths from all causes, of which 136, or 23.6 per cent, were

from consumption. Of the mortality of plasterers from respiratory diseases other than consumption, 67 were from pneumonia, 5 from asthma, 14 from bronchitis, and 7 from less frequent respiratory diseases. If the deaths from consumption and from other respiratory diseases are combined, 39.7 per cent of the mortality of plasterers was from diseases of the lungs and air passages. The excess in the consumption mortality of plasterers is still more clearly brought out in the tabular presentation of the proportionate mortality from this disease by divisional periods of life. While the consumption mortality was excessive at all ages under 65, the excess was most pronounced at ages 25 to 34, when out of every 100 deaths from all causes 44.9 were from consumption, against a normal expected proportion of 31.3. The analysis of the consumption mortality of plasterers is set forth in detail in the table below:

PROPORTIONATE MORTALITY FROM CONSUMPTION AMONG **PLASTERERS**, 1897 TO 1906, COMPARED WITH THAT OF ALL MALES IN THE REGISTRATION AREA OF THE UNITED STATES, 1900 TO 1906, BY AGE GROUPS.

[Figures for plasterers from experience of an industrial insurance company; figures for males in registration area computed from mortality statistics of the United States census.]

Age at death.	Deaths of plasterers, 1897 to 1906, due to—		Per cent of deaths due to consumption among—	
	All causes.	Consumption.	Plasterers.	Males in registration area, 1900 to 1906.
15 to 24 years	25	7	28.0	27.8
25 to 34 years	78	35	44.9	31.3
35 to 44 years	107	38	35.5	23.6
45 to 54 years	127	35	27.6	15.0
55 to 64 years	121	16	13.2	8.1
65 years or over	119	5	4.2	2.7
Total	577	136	23.6	14.8

The preceding observations and statistical data, including the industrial insurance mortality experience of this occupation, would seem to confirm the conclusion that this employment is injurious to health, and that the degree of consumption frequency is above the average at all ages under 65, and decidedly so at ages 25 to 34.

PAPER HANGERS.

Paper hangers, equally with plasterers, are exposed to a considerable risk of mixed-dust inhalation, chiefly of mineral origin. During the operation of removing old wall paper from the walls a large amount of dust is created, against which practically no precautions are taken and no effort is made to reduce the dust to a minimum. Since wall paper often, if not as a rule, contains colored pigments more or less injurious to health and occasionally poisonous metallic

substances, such as arsenic, there is an additional risk to health from this source which occasionally has assumed serious proportions. It would seem that a rational health administration should intervene to compel a previous disinfection of premises in which consumptives have died before the same are permitted to be redecorated by plasterers or paper hangers.

In Rhode Island during the 10 years ending with 1906 the number of recorded deaths of paper hangers from all causes was only 14, but of these 3, or 21.4 per cent, were from consumption, and 3, or 21.4 per cent, from other respiratory diseases. Of the total recorded mortality 6, or 42.8 per cent, were from diseases of the lungs and air passages.

The recorded industrial insurance mortality statistics of paper hangers include 319 deaths from all causes, of which 107, or 33.5 per cent, were from consumption. Of the deaths of paper hangers from other respiratory diseases, 30 were from pneumonia and 8 from other diseases of this class. The mortality of paper hangers from consumption was excessive at ages 15 to 44, but most so at ages 35 to 44, when of the deaths from all causes 44.6 per cent were from this disease, against a normal expected proportion of 23.6. The following table analyzes the consumption mortality of paper hangers:

PROPORTIONATE MORTALITY FROM CONSUMPTION AMONG **PAPER HANGERS**, 1897 TO 1906, COMPARED WITH THAT OF ALL MALES IN THE REGISTRATION AREA OF THE UNITED STATES, 1900 TO 1906, BY AGE GROUPS.

[Figures for paper hangers from experience of an industrial insurance company; figures for males in registration area computed from mortality statistics of the United States census.]

Age at death.	Deaths of paper hangers, 1897 to 1906, due to—		Per cent of deaths due to consumption among—	
	All causes.	Consumption.	Paper hangers.	Males in registration area, 1900 to 1906.
15 to 24 years	33	14	42.4	27.8
25 to 34 years	96	47	49.0	31.3
35 to 44 years	74	33	44.6	23.6
45 to 54 years	55	8	14.5	15.0
55 to 64 years	34	4	11.8	8.1
65 years or over	27	1	3.7	2.7
Total	319	107	33.5	14.8

There are no official vital statistics of paper hangers as a class separate and distinct from plasterers and similar occupations, and the only source of accurate information regarding the degree of consumption frequency among men in this employment is the industrial insurance mortality statistics, briefly referred to above.

When the insurance mortality statistics of paper hangers are compared with those of plasterers, the statistical evidence appears to be

conclusive that the degree of consumption frequency among paper hangers is decidedly higher than the corresponding degree of consumption frequency among plasterers. While at all ages the proportion of deaths from consumption was 23.6 per cent for plasterers, it was 33.5 for paper hangers; at ages 15 to 24 the respective consumption percentages were 28.0 for plasterers against 42.4 for paper hangers; at 25 to 34, 44.9 per cent for plasterers and 49.0 per cent for paper hangers; at 35 to 44, 35.5 per cent for plasterers against 44.6 per cent for paper hangers. At ages 45 or over the percentages were more favorable to paper hangers than to plasterers.

Summarizing the rather limited amount of statistical information regarding the mortality of paper hangers, the available data would seem to warrant the conclusion that the degree of consumption frequency in this occupation is decidedly excessive at ages under 45 when comparison is made with occupied males generally and the occupation of plasterers in particular.

FOUNDRYMEN AND MOLDERS.

Foundrymen and molders are to a very considerable degree exposed to the continuous inhalation of both metallic and mineral dusts. While the proportion of metallic dust is quantitatively small, it is probably the more injurious of the two, although its effects are modified by the relatively much larger amount of mineral dust. The industry is varied, of large extent, and widely distributed throughout the country. The conditions affecting health naturally vary, and chiefly so on account of the metal used in casting, which may be iron, steel, brass, etc. The employments in foundry practice are chiefly those of molders and clay mixers, of which molders, again, are subdivided into those who work at a bench, or in the making of small ware, and those who work on the floor or in the pits in the making of castings of larger size. Within recent years labor-saving appliances have been extensively introduced into the large foundries, chiefly in connection with iron and steel works, but corresponding progress has not been made in the smaller establishments. The introduction of machinery has led to the employment of much unskilled labor of low grade, which complicates the value of the available mortality returns. It is also necessary to take into consideration the not inconsiderable accident liability of men employed in foundries, and the occasional or general exposure to extreme heat and the liability to overstrain inseparable from the lifting of heavy weights of metal.

An investigation into the sanitary aspects of this employment made by the state board of health of Massachusetts disclosed the fact that at fourteen foundries in which castings of all kinds were made, in seven the conditions as to light, ventilation, and dust removal were

very poor. Of nine stove foundries inspected, four presented moderately bad and one distinctly bad conditions affecting the health of employees. In the polishing room of one factory, conducted under almost ideal conditions, the emery wheels were well equipped with hoods and exhaust ventilators, but the report states that "the men, unmindful of the protection provided, habitually remove the hoods, and become covered with emery and iron particles."

In reporting in some detail upon the establishments found to be more or less unsatisfactory as to light, ventilation, and dust removal, the report states that one shop "employs 275 men, in low-studded, poorly lighted, unventilated buildings, in which there is no attempt to remove the dust arising from the processes of polishing and buffing by hoods and exhaust ventilation. In the tumbling room the dust is so thick that objects a few feet distant can not clearly be made out. Many men refuse to work in this establishment in the hot months, on account of the excessive heat and general discomfort."

The vital statistics of this group of employments are not conclusive. In Rhode Island 157 deaths of molders have been recorded during the period 1897 to 1906, and of this number 31, or 19.7 per cent, were from consumption, 21 were from pneumonia, and 4 were from asthma and bronchitis, a total of 35.6 per cent of the mortality from all causes from diseases of the lungs and air passages. Respiratory diseases other than consumption are shown to have been of about the same degree of relative frequency as consumption.

The high mortality of foundrymen and molders from consumption observed to occur at advanced ages is decidedly suggestive. Evidently the progress of the disease in these occupations is slow, and often, if not as a rule, assumes the form of fibroid phthisis. There can be no question of doubt that there is in these occupations an intimate connection between the continuous exposure to metallic and mineral dust inhalation and the relative frequency of the disease. Considering the nature of the dust inhaled, this is what would be expected. The dust being largely mineral, but partly metallic, the proportion of iron dust, while quite considerable, is not so great in quantity as the iron dust inhaled by men engaged in cutlery grinding or file cutting. No doubt many of the dangers of the employment could be guarded against by attention to safety devices, chiefly respirators, to be worn during the actual mold-making processes. The employment, by its very nature, however, precludes very radical methods of dust prevention, and the most effective safeguard would be short hours of labor and a rational use of spare hours and vacations.

There are no official vital statistics of these occupations either for the United States or for England and Wales. The recorded industrial insurance mortality statistics of foundrymen and molders are very extensive and include 1,397 deaths from all causes, of which 311,

or 22.3 per cent, were from consumption. Of the deaths of foundrymen and molders from respiratory diseases other than consumption, 14 were from asthma, 21 from bronchitis, 211 from pneumonia, and 31 from other diseases of this class. If the deaths from consumption and from other respiratory diseases are combined, 42.1 per cent of the mortality of foundrymen and molders was from diseases of the lungs and air passages. The mortality of foundrymen and molders was excessive at all ages over 25, but the excess was most pronounced at ages 25 to 34, when out of every 100 deaths of foundrymen from all causes, 40.4 were from consumption, against a normal expected proportion of 31.3. The analysis of the consumption mortality of foundrymen and molders in detail is set forth in the following table:

PROPORTIONATE MORTALITY FROM CONSUMPTION AMONG **FOUNDRYMEN AND MOLDERS**, 1897 TO 1906, COMPARED WITH THAT OF ALL MALES IN THE REGISTRATION AREA OF THE UNITED STATES, 1900 TO 1906, BY AGE GROUPS.

[Figures for foundrymen and molders from experience of an industrial insurance company; figures for males in registration area computed from mortality statistics of the United States census.]

Age at death.	Deaths of foundrymen and molders, 1897 to 1906, due to—		Per cent of deaths due to consumption among—	
	All causes.	Consumption.	Foundrymen and molders.	Males in registration area, 1900 to 1906.
15 to 24 years	122	29	23.8	27.8
25 to 34 years	228	92	40.4	31.3
35 to 44 years	300	82	27.3	23.6
45 to 54 years	292	65	22.3	15.0
55 to 64 years	239	27	11.3	8.1
65 years or over	216	16	7.4	2.7
Total	1,397	311	22.3	14.8

The preceding observations and statistical data, derived chiefly from industrial insurance mortality experience, seem to confirm the conclusion that this employment is more or less injurious to health, and that the degree of consumption frequency is excessive at ages 25 or over.

CORE MAKERS.

Core making is an essential branch of foundry practice. The occupation gives employment to a considerable number of young persons, mostly boys, but of late years girls have been drawn into the trade, although it is held that the more arduous duties and surrounding conditions of the occupation are unsuited to the female sex. No qualified investigation appears to have been made into the health conditions of this employment, but in a general way the conditions approximate those of foundry practice in general. There is a considerable exposure to both mineral and metallic dust, but the fact that large numbers follow this occupation for only a comparatively short time no

doubt prevents the more serious results which would follow if the exposure were continued for many years.

There are no official vital statistics of these occupations either for the United States or for England and Wales. The recorded industrial insurance mortality statistics of core makers include 162 deaths from all causes, of which 48, or 29.6 per cent, were from consumption. Of the mortality of core makers from respiratory diseases other than consumption, 24 were from pneumonia and 4 were from other diseases in this group. If the deaths from consumption and from other respiratory diseases are combined, 46.9 per cent of the mortality of core makers was from diseases of the lungs and air passages. The excess in the mortality from consumption falls almost exclusively upon ages under 45, since comparatively few deaths have occurred at ages 45 or over. The analysis of the consumption mortality of core makers is set forth in detail in tabular form below:

PROPORTIONATE MORTALITY FROM CONSUMPTION AMONG **CORE MAKERS**, 1897 TO 1906, COMPARED WITH THAT OF ALL MALES IN THE REGISTRATION AREA OF THE UNITED STATES, 1900 TO 1906, BY AGE GROUPS.

[Figures for core makers from experience of an industrial insurance company; figures for males in registration area computed from mortality statistics of United States census.]

Age at death.	Deaths of core makers, 1897 to 1906, due to—		Per cent of deaths due to consumption among—	
	All causes.	Consumption.	Core makers.	Males in registration area, 1900 to 1906.
15 to 24 years	66	20	30.3	27.8
25 to 34 years	42	17	40.5	31.3
35 to 44 years	25	9	36.0	23.6
45 to 54 years	9	1	11.1	15.0
55 to 64 years	9	1	11.1	8.1
65 years or over	11	.....	.....	2.7
Total	162	48	29.6	14.8

While statistical information regarding persons employed as core makers is very limited, the evidence is entirely conclusive that the degree of consumption frequency in this occupation is decidedly excessive at ages 15 to 44, inclusive.

LITHOGRAPHERS.

Lithographers constitute an important branch of the printing trade. In the census reports lithographers are included in the occupation statistics of printers and pressmen, so that the actual number of lithographers in the United States is not known. For hygienic reasons the employment of the lithographer requires to be considered separately from printing and engraving, since in the former the exposure is chiefly to mineral dust, while the latter are exposed primarily to the inhalation of metallic dust. Lithographic stone has

been defined as a fine, compact homogeneous limestone, practically all of which is imported from Germany. The small amount of lithographic stone quarried in the United States varies in its mineral and metallic constituents from the Bavarian stone, containing nearly 7 per cent of magnesia. No accurate observations have been made a matter of record to determine the degree of possible lung injury resulting in the case of the lithographer's occupation, but it is safe to assume that the employment requires to be included in the group of dusty trades. This conclusion is fully sustained by a knowledge of the technical processes which constitute the lithographic art.

The sanitary conditions of this employment received consideration by Sir John Simon in his report as medical officer of the privy council. Simon called attention to the dust resulting from the use of colors and pigments, against the inhalation of which only very few of the workmen had adopted intelligent precautions. The most pernicious of the mineral colors employed in connection with lithography were emerald green and bronze. Simon did not connect the inhalation of this dust with the occurrence of phthisis, but the inference would seem warranted that such a connection exists, at least in exceptional cases.

Parry, in his treatise on Risks and Dangers of Various Occupations, confirms this earlier opinion, and holds that in lithographing green arsenical pigments are used, the poisonous dust of which is inhaled and conveyed to the stomach. It is evident that the poisonous character of the colors or pigments is a more serious factor than the less injurious dust of the stone itself, but how far either form of dust increases the liability to consumption has not been determined.

The most recent English mortality statistics of lithographers are for the three years ending with 1902, referred to in the Supplement to the Sixty-fifth Annual Report of the Registrar-General (p. lix) in part as follows:

At all ages except 20 to 25 and 45 to 55 the death rates among these workers exceed the standard for all occupied and retired males. These workers experience a lower mortality than printers up to the age of 45, but beyond that age the mortality in the two occupations differs but slightly. In the main working period of life the comparative mortality figure of lithographers is 964, or 4 per cent, below the average. Their mortality from influenza and phthisis considerably exceeds the standard, while that from respiratory diseases is below it by about an equal amount.

The English mortality statistics for lithographers are rather inconclusive as to a decidedly unfavorable effect of this industry on health, and while in the table which follows a comparison is made of the mortality from all causes of men in this group with occupied males generally, the death rates are, as a rule, below the average for occupied males generally except at ages 20 to 24 and 45 to 54, inclusive.

MORTALITY FROM ALL CAUSES OF **LITHOGRAPHERS**, COMPARED WITH THAT OF ALL OCCUPIED MALES IN ENGLAND AND WALES, 1900 TO 1902, BY AGE GROUPS.

[From Part II, Supplement to the Sixty-fifth Annual Report of the Registrar-General of Births, Deaths, and Marriages in England and Wales.]

Age at death.	Death rate per 1,000 for all occupied males.	Death rate for lithographers.		
		Rate per 1,000.	Greater (+) or less (−) than rate for all occupied males.	Ratio to rate for all occupied males.
15 to 19 years	2.44	1.55	−0.89	64
20 to 24 years	4.41	5.36	+ .95	122
25 to 34 years	6.01	5.62	− .39	94
35 to 44 years	10.22	8.41	−1.81	82
45 to 54 years	17.73	19.94	+2.21	112
55 to 64 years	31.01	30.84	− .17	99
65 years or over	88.39	82.25	−6.14	93

The preceding table is self-explanatory and requires no further comment, but a more extended comparison, however, is made in the next table, in which the mortality of lithographers from consumption is compared with the normal mortality of occupied males from this disease, by divisional periods of life. This table shows that the mortality of lithographers from consumption was above the average at all ages by from 0.23 to 2.17 per 1,000. The excess is not very marked and does not warrant decidedly unfavorable conclusions. The table which follows requires no further comment and is otherwise self-explanatory.

MORTALITY FROM CONSUMPTION AMONG **LITHOGRAPHERS**, COMPARED WITH THAT OF ALL OCCUPIED MALES IN ENGLAND AND WALES, 1900 TO 1902, BY AGE GROUPS.

[From Part II, Supplement to the Sixty-fifth Annual Report of the Registrar-General of Births, Deaths, and Marriages in England and Wales.]

Age at death.	Mortality from consumption.			
	Death rate per 1,000 for all occupied males.	Death rate for lithographers.		
		Rate per 1,000.	Greater (+) or less (−) than rate for all occupied males.	Ratio to rate for all occupied males.
15 to 19 years	0.54	0.77	+0.23	143
20 to 24 years	1.55	2.68	+1.13	173
25 to 34 years	2.03	2.70	+ .67	133
35 to 44 years	2.74	3.13	+ .39	114
45 to 54 years	3.04	4.27	+1.23	140
55 to 64 years	2.16	4.33	+2.17	200
65 years or over	1.11	1.44	+ .33	130

The recorded industrial insurance mortality statistics of lithographers include 160 deaths from all causes, of which 70, or 43.8 per cent, were from consumption. Of the mortality of lithographers from respiratory diseases other than consumption, 3 were from bronchitis,

18 from pneumonia, and 1 from another disease of this class. If the deaths from consumption and from other respiratory diseases are combined, 57.5 per cent of the mortality of lithographers was from diseases of the lungs and air passages. The number of deaths of lithographers included in this analysis is sufficiently large to warrant a more definite conclusion than the corresponding general vital statistics of this occupation for England and Wales. The excess in the consumption mortality of lithographers is still more clearly brought out in the tabular presentation of the proportionate mortality from this disease, by divisional periods of life. The comparison shows that the consumption mortality was excessive at all ages under 65, but decidedly so at ages 15 to 34. At 15 to 24 the proportion of deaths from consumption among lithographers was 56.8 per cent against a normal expected proportion of 27.8, while at ages 25 to 34 the proportionate consumption percentage was 62.2 for lithographers against a normal expected proportion of 31.3. The analysis of the consumption mortality of lithographers is set forth in detail in the following table:

PROPORTIONATE MORTALITY FROM CONSUMPTION AMONG **LITHOGRAPHERS**, 1897 TO 1906, COMPARED WITH THAT OF ALL MALES IN THE REGISTRATION AREA OF THE UNITED STATES, 1900 TO 1906, BY AGE GROUPS.

[Figures for lithographers from experience of an industrial insurance company; figures for males in registration area computed from mortality statistics of the United States census.]

Age at death.	Deaths of lithographers, 1897 to 1906, due to—		Per cent of deaths due to consumption among—	
	All causes.	Consumption.	Lithographers.	Males in registration area, 1900 to 1906.
15 to 24 years	37	21	56.8	27.8
25 to 34 years	45	28	62.2	31.3
35 to 44 years	29	13	44.8	23.6
45 to 54 years	21	5	23.8	15.0
55 to 64 years	18	3	16.7	8.1
65 years or over	10	.....	.....	2.7
Total	160	70	43.8	14.8

The preceding observations and statistical data confirm the conclusion that lithographers as a class are subject to an excessive mortality from consumption, but in particular at ages 15 to 44, and this excess, in view of the conditions of labor briefly described, is in a large measure the result of health-injurious circumstances connected with the employment.

SUMMARY OF CONCLUSIONS REGARDING OCCUPATIONS WITH EXPOSURE TO MINERAL DUST.

In the foregoing observations and statistical data twelve occupations, involving exposure to mineral dust, have been considered in

detail. As stated in the summary of conclusions regarding occupations with exposure to metallic dust, it is not possible in all cases to base conclusions upon identical data, as official vital statistics are not available for some of the occupations here considered. The census returns of 1900 give the age distribution of marble and stone cutters, glass workers, potters, plasterers, and paper hangers, the aggregate number of such persons being 168,404. This number is exclusive of persons under 15 and of unknown ages. The statistics show that only 4,409, or 2.6 per cent, had attained to an age of 65 years or over, against a normal expected proportion of 4.7. This fact in itself is decidedly suggestive of conditions more or less unfavorable to health and life in occupations exposing to mineral dust. The details of the age distribution are given in the following table by divisional periods of life, together with the corresponding distribution of all occupied males, the data for both groups being derived from the census of 1900.

NUMBER AND PER CENT OF MALES IN EACH AGE GROUP IN **OCCUPATIONS EXPOSED TO MINERAL DUST,** COMPARED WITH NUMBER AND PER CENT IN ALL OCCUPATIONS IN THE UNITED STATES, 1900.

[From report of the Bureau of the Census on Occupations, 1900.]

Age.	Males in occupations exposed to mineral dust.		All occupied males.	
	Number.	Per cent.	Number.	Per cent.
15 to 24 years	40,454	24.0	5,933,720	26.0
25 to 34 years	49,987	29.7	5,993,847	26.3
35 to 44 years	38,253	22.7	4,704,682	20.6
45 to 54 years	24,784	14.7	3,250,259	14.3
55 to 64 years	10,517	6.3	1,856,181	8.1
65 years or over	4,409	2.6	1,063,856	4.7
Total	168,404	100.0	22,802,545	100.0

According to this analysis, the proportion of persons aged 15 to 34 was 53.7, or more than half of the total, against 52.3 expected. At ages 35 to 44 the proportion was 22.7 for the group under consideration, against 20.6 among occupied males generally. At ages 45 or over the proportion of persons employed in occupations with exposure to mineral dust was only 23.6, against 27.1 for occupied males generally. In some of the trades included in this group a considerable amount of muscular labor is involved, and this is especially true of glass blowers and certain occupations in the pottery industry. It is, doubtless, for this reason that the age distribution in this group of employments conforms somewhat more to that of all occupied males than was true of the occupations in the group exposed to metallic dust.

It is possible to present a combined summary of the United States census vital statistics of persons employed as marble and stone

cutters, glass workers, and plasterers. A comparison of the death rates in these combined occupations with the corresponding death rates of occupied males generally is very suggestive of unfavorable health conditions in occupations exposed to mineral dust. These unfavorable health conditions manifest themselves in an increased mortality at all ages above 25, while at ages 15 to 24 the mortality rate from all causes is slightly more favorable for the occupations in this group than for occupied males generally. The number of deaths, however, in the earlier age groups is too small to warrant final conclusions. At ages 25 to 44 the death rate from all causes in the occupations of this group was 9.88, against 8.78 expected; at ages 45 to 64 the death rate in the group under consideration was 24.04, against 19.91 expected; and at ages 65 or over the rate was 106.87, against 98.44 expected. The death rate from consumption was 4.87 per 1,000, against 2.37 expected, and the death rate from other respiratory diseases was 1.99, against 1.97 expected. The details of the mortality by ages are given in the following table, together with the corresponding death rates for all occupied males, the data for both groups being derived from the census of 1900:

MORTALITY FROM ALL CAUSES AMONG MALES IN **OCCUPATIONS EXPOSED TO MINERAL DUST** IN THE REGISTRATION STATES, COMPARED WITH THAT OF ALL OCCUPIED MALES IN THOSE STATES, 1900, BY AGE GROUPS.

[From report of the Bureau of the Census on Vital Statistics, 1900.]

Age.	Males in occupations exposed to mineral dust.			All occupied males.		
	Number employed.	Number of deaths from all causes.	Rate per 1,000 from all causes.	Number employed.	Number of deaths from all causes.	Rate per 1,000 from all causes.
15 to 24 years	8,724	39	4.47	1,259,471	6,486	5.15
25 to 44 years	24,506	242	9.88	2,680,241	23,541	8.78
45 to 64 years	9,899	238	24.04	1,282,259	25,532	19.91
65 years or over	1,179	126	106.87	283,310	27,888	98.44
Total	44,308	645	[a] 14.56	5,505,281	83,447	[b] 15.16

[a] From consumption there were 216 deaths, or a rate of 4.87; from other diseases of the respiratory system there were 88 deaths, or a rate of 1.99.

[b] The rate of mortality from consumption was 2.37; from other diseases of the respiratory system 1.97.

The occupation mortality statistics of Rhode Island are available for four specific occupations of this group and when combined return 321 deaths from all causes, of which 79 were from consumption and 53 from respiratory diseases other than consumption. The corresponding percentages were 24.6 of deaths from consumption for persons employed in occupations with exposure to mineral dust, against 17.8 for occupied males generally in the State of Rhode Island. The percentage of deaths from respiratory diseases other

than consumption was 16.5 for the occupations in this group, against 12.5 expected.

The English vital statistics for this group of occupations are available for glass workers, potters, paper hangers and plasterers, and lithographers. When the returns for these occupations are combined they exhibit excessive death rates at all ages over 35.

The details in tabular form are set forth in the following table:

MORTALITY FROM ALL CAUSES, FROM CONSUMPTION, AND FROM OTHER RESPIRATORY DISEASES IN **OCCUPATIONS EXPOSED TO MINERAL DUST,** COMPARED WITH THAT OF ALL OCCUPIED MALES IN ENGLAND AND WALES, 1900 TO 1902, BY AGE GROUPS.

[From Part II, Supplement to the Sixty-fifth Annual Report of the Registrar-General of Births, Deaths, and Marriages in England and Wales.]

Age at death.	Death rate per 1,000 due to all causes among—		Death rate per 1,000 due to consumption among—		Death rate per 1,000 due to other diseases of the respiratory system among—	
	All occupied males.	Occupations exposed to mineral dust.	All occupied males.	Occupations exposed to mineral dust.	All occupied males.	Occupations exposed to mineral dust.
15 to 19 years.....	2.44	2.35	0.54	0.55	0.24	0.27
20 to 24 years.....	4.41	4.02	1.55	1.44	.48	.50
25 to 34 years.....	6.01	5.24	2.03	2.01	.77	.78
35 to 44 years.....	10.22	12.46	2.74	3.96	1.66	2.12
45 to 54 years.....	17.73	23.74	3.04	4.91	3.32	6.05
55 to 64 years.....	31.01	40.23	2.16	3.94	6.54	12.86
65 years or over...	88.39	92.60	1.11	1.13	17.77	24.50

The table shows that the mortality from consumption among men in occupations with exposure to mineral dust was decidedly excessive at ages 35 to 64, and the mortality at the other ages was not appreciably lower than for occupied males generally. The mortality from respiratory diseases other than consumption was normal in this group of employments at ages 15 to 34, but at ages 35 or over the mortality was considerably in excess of that for all occupied males.

The recorded industrial insurance mortality statistics are available for 11 occupations included in this group, returning in the aggregate 4,543 deaths from all causes. Of this number 1,299, or 28.6 per cent, were from consumption. The deaths from other respiratory diseases numbered 762, or 16.8 per cent. The expected consumption mortality on the basis of the mortality among males in the registration area of the United States for the seven-year period 1900 to 1906 was 14.8 per cent, and from respiratory diseases other than consumption 11.7 per cent. When the mortality from consumption and from other respiratory diseases is combined, the proportionate number of deaths among males in occupations with exposure to mineral dust was 45.4 against 26.5 per cent expected.

PROPORTIONATE MORTALITY FROM CONSUMPTION IN **OCCUPATIONS EXPOSED TO MINERAL DUST,** 1897 TO 1906, COMPARED WITH THAT OF ALL MALES IN THE REGISTRATION AREA OF THE UNITED STATES, 1900 TO 1906, BY AGE GROUPS.

[Figures for occupations exposed to mineral dust from experience of an industrial insurance company; figures for males in registration area computed from mortality statistics of the United States census.]

Age at death.	Deaths in occupations exposed to mineral dust, 1897 to 1906, due to—		Per cent of deaths due to consumption in—	
	All causes.	Consumption.	Occupations exposed to mineral dust.	Males in registration area 1900 to 1906.
15 to 24 years	413	131	31.7	27.8
25 to 34 years	821	391	47.6	31.3
35 to 44 years	936	340	36.3	23.6
45 to 54 years	950	265	27.9	15.0
55 to 64 years	795	129	16.2	8.1
65 years or over	628	43	6.8	2.7
Total	4,543	[a] 1,299	[a] 28.6	[b] 14.8

[a] There were also 762 deaths from other diseases of the respiratory system, or 16.8 per cent of the deaths from all causes.
[b] The per cent of deaths from other diseases of the respiratory system in the registration area was 11.7.

It is evident from the foregoing observations and statistical data relating to a representative number of employments with exposure to mineral dust that the health-injurious effects of such exposure reveal themselves in a high general death rate, especially at ages 35 or over, and with correspondingly high specific death rates from consumption and from other respiratory diseases at ages 35 or over, by which time the dust inhaled has begun to show its fatal effect.

OCCUPATIONS WITH EXPOSURE TO VEGETABLE FIBER DUST.

In the group of occupations exposing to a continuous and considerable inhalation of vegetable fiber dust resulting from industrial processes the following representative employments have for the present purpose been included: Cotton ginning, cotton textile manufacture, spinning, weaving, hosiery and knitting mills, lace making, flax and linen manufacture, hemp and cordage manufacture, manufacture of jute and jute goods, paper manufacture, cabinetmaking, wood turning and carving. These occupations are all more or less subject to an excessive death rate from all causes, but in particular to a decided excess in the proportionate mortality from consumption, and in most cases also to a comparatively high degree of frequency in the occurrence of other respiratory diseases. The details of labor conditions as far as they could be conveniently included in the following summary of observations regarding particular trades appear to fully confirm the opinion that the degree of excess in consumption fre-

quency is intimately related and in almost exact proportions to the degree of exposure to continuous and considerable inhalation of vegetable fiber dust.

COTTON GINNING.

Cotton ginning is the most important preliminary process in cotton manufacture, and is carried on extensively as a separate industry throughout the Southern States. The process consists of "stripping the fiber of cotton from the seed" by a most ingenious mechanical device, the best known of which is the so-called McCarthy machine, in common use throughout the United States.[a] An improvement, however, has been perfected, known as the so-called "saw gin," which has the decided advantage of a material increase in producing capacity. The object being to secure the largest amount of lint, or clean cotton, it is remarkable that from every ton of raw cotton only about 600 pounds reach the spinner. The amount of dust and dirt generated in the ginning process is, of necessity, very large, and the employment is, without question, decidedly detrimental to health. It is mitigated by the fortunate circumstance that it is carried on, as a rule, only for a portion of the year, and largely because of this fact the health conditions of the occupation have not attracted so much attention as would otherwise have been the case.

The enormous extent of the cotton-ginning industry is measured by the number of bales of cotton ginned during 1904, when the crop attained to 13,500,000 bales which, at 500 pounds each, represent 6,750,000,000 pounds of cotton passing through the gins. Most of the cotton is short staple, only about 1 per cent being Sea Island or long staple variety. The gins are either public or private establishments or merchant gins, all of which, however, have the essential features in common. They are now practically all run by steam power, the former use of horse or water power having almost disappeared. A ginnery includes three departments; that is, the ginhouse proper, the lint room, and the cotton compress, or screw, as it is usually known. In an early description of the conditions in the lint room, as a part of the United States census report on cotton manufacture for 1880, it was stated that—

The lint room varies in size from one-third to the full length of the end of the ginhouse to which it is attached. The lint cotton is thrown by the brush cylinder of the gin through a flue into this room. Strange to say, the lint rooms are not brushed or swept out from one season to another, or from one decade to another, for that matter. The dirt may accumulate an inch in depth on the floors and walls, but no broom is ever carried into this room from year to year.[b]

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[a] For an instructive and valuable descriptive account, see the Scientific American Supplement for April 1, 1905. See also Census Bulletin No. 97, on Supply and Distribution of Cotton, for the year ending August 31, 1908.

[b] Report of the Tenth Census, Vol. II, p. 945.

The ginning process itself is well described in an account of the so-called Gullett cotton-ginning system, which is in general use throughout the Southern States:

The seed cotton is elevated by suction from the wagon or storage house, and deposited in feeders over each gin. These machines feed it uniformly into the roll boxes of gins, where the lint is separated from the seed. The lint is then blown by the draft from the brush through the flue system into the condenser, which forms it into a bat and deposits it direct in the press, where it is packed by the steam packer and baled, the dust from the condenser passing out through the roof by means of the dust flues. The seed falls from the roll boxes of gins into a screw conveyor underneath, through hoppers at each gins, however, the earlier conditions still prevail, and the dust nuisance during the ginning process constitutes a serious menace to the health of the employees.

The claims for this system are economy of time and labor and the material reduction of the dust nuisance. In the large majority of gins, however, the earlier conditions still prevail, and the dust nuisance during the ginning process constitutes a serious menace to the health of the employees.

The hygienic aspects of the sanitary problems in cotton ginning were early commented upon by Daniel Drake, M. D., in his treatise on the Principal Diseases of the Interior Valley of North America, where, in considering the miscellaneous causes of pulmonary inflammation, with special reference to the Southern States, he comments upon cotton fuzz and its effects upon the respiratory organs, referring in particular to employment in cotton gins. According to Drake—

The gin is a machine of rapid motion for eliminating the seed from cotton. It throws an immense amount of broken fibers or fuzz into the atmosphere, which are of necessity taken into the lungs of those who conduct the operation, who are generally Negroes. The period of ginning does not last very long, nor are a great number of operatives necessary to the management of a gin. When traveling in the South, I learned that proprietors do what they can to promote ventilation, avoid their ginhouses, and avoid employing men who are predisposed to pulmonary disease, and often change them, so that no one shall inhale the fuzz very long. These precautions indicate, as the public opinion, that it may do harm, as indeed it undoubtedly does, but to a less extent than might perhaps be expected.[a]

The observations of Drake as to the health-injurious effects of the cotton-ginning process were confirmed by other practicing physicians of the period and the earlier view is sustained by present-day medical opinion throughout the South. Since there are no vital statistics of persons employed in cotton ginning and no published observations of

[a] Principal Diseases of the Interior Valley of North America, by Daniel Drake, Vol. II, p. 799.

medical practitioners at the present time, these brief observations are concluded by quoting the opinion of Mr. A. E. Thomas, a cotton planter before the war, who, with special reference to the susceptibility of the Negro, who continues to constitute the large majority of persons employed in connection with cotton-ginning processes, states that—

This subject is one of great interest with all our intelligent planters, as the effect of cotton ginning on their Negroes is very deleterious; so injurious, indeed, as to be obvious to the Negroes themselves, who endeavor to avoid the ginhouse. Planters select their oldest and least valuable Negroes for this occupation, knowing that the healthiest and most robust will, in a year or two, become diseased. To prevent these bad effects, it is not uncommon to make them wear and breathe through a veil, and give them molasses and water to drink, measures which appear to be generally effective. If a person not accustomed to breathe the air of a ginhouse goes into it while the machine is running, he is soon seized with a tickling sensation in his nostrils, followed by sneezing, coughing, and some degree of hoarseness. Continuing awhile in this situation, he begins to feel his nostrils stuffed up. After leaving the place he will have symptoms of a cold for several days. Remaining there longer, the stuffing of his nostrils may become so great as to prevent his breathing through them. The cough attendant on this affection is often dry, or small quantities of mucus, in which the lint and dust floating in the air have been entangled, will be thrown up. A feeling of soreness pervades the trachea and bronchial tubes. I have known several to have chronic bronchitis. I saw one death preceded by the discharge of an abscess from the lungs, and another die of phthisis, following on bronchitis. It is the custom every two or three weeks to stop the hands from field labor to bale the gin and cotton, at which they are commonly occupied two or three days. Before the end of this period they are apt to become affected with sneezing, coughing, and other catarrhal symptoms, which often continue for several days.[a]

It is evident, even in the absence of conclusive statistical data, that cotton ginning is a decidedly health-injurious employment, and that it would be much more so than actually observed in everyday experience but for the fact that the occupation extends over only a comparatively short period of the year.

COTTON TEXTILE MANUFACTURE.

In 1905 the manufacture of cotton textiles in the United States gave employment to 315,874 wage-earners, of whom 46.6 per cent were adult males, 40.6 per cent women, and 12.8 per cent children.[b] The diversity of the industry is considerable, and the processes of manu-

[a] Principal Diseases of the Interior Valley of North America, by Daniel Drake, Vol. II, p. 801.

[b] Census of Manufactures, 1905, Part I, p. lxxviii.

facture require a high degree of specialized labor. Every process from the so-called "opening" of the cotton in the picker room to the carding, spinning, and weaving involves a more or less considerable degree of exposure to the inhalation of vegetable fiber dust, but the exposure varies materially in the different departments. The health aspects of the industry are complicated by other injurious factors besides dust, of which high temperature, excessive humidity, atmospheric electricity, noise, eye strain, and defective ventilation are the most important. The effects upon health in cotton textile manufacture, with special reference to dust exposure, have been admirably summed up by Arlidge, who, in his treatise on The Hygiene, Diseases, and Mortality of Occupations, remarks:

To summarize the incidental causes of ill health among cotton operatives, they are, dust from the cotton itself in the early processes of manufacture; heat with more or less watery vapor, combined in the weaving department with dust from the Cornish clay employed for sizing; long standing, and a stooping posture in the spinning and doubling department; monotony of work; continuous strain upon the attention; and excessive noise with vibration of machinery. To these must be added vitiated air from excessive consumption of gas, from overcrowding, and general defects of ventilation.

With special reference to the frequent occurrence of lung diseases among cotton workers, Arlidge holds that—

The dust of cotton is an irritant to the pharynx and larynx, where it speedily produces a feeling of dryness and huskiness. If inhaled longer, it reaches the bronchi, and sets up cough with white mucous expectoration. The cough will be for years chiefly a morning phenomenon on first rising, but it is also induced upon leaving the warm workroom. Fine fibers of cotton are found, on microscopical examination, in the sputum, and as these make their way into the pulmonary tissue, they set up morbid action, resulting in increasing density of it on the one hand, and of emphysematous expansion on the other. These morbid changes are accompanied by dyspnœa, wastings, and debility, but rarely with hæmoptysis; and together constitute a group of symptoms not inappropriately termed "industrial phthisis." Moreover, intercurrent diseases of the lungs, such as acute bronchitis and pneumonia, often arise and terminate life; and true tubercular phthisis is no uncommon cause of death.

The following is an extract from the observations of Lloyd, who confirms the observations of Arlidge in the statement that—

The dust of cotton, or "flue" as it is called, is composed largely of cotton fiber, and it has an appreciable taste and smell, especially to a person unused to it. It causes irritation to the nose, throat, larynx, and bronchial tubes. The symptoms are dryness of the throat, huskiness of the voice, cough, and expectoration. The cough is said to be worse in the morning, the expectoration being tenacious and difficult to be gotten rid of. Fibers of cotton have been found in the sputa with the microscope. In time proliferation of connective tissue

ensues, as in most cases of industrial phthisis, and dyspnœa and emaciation occur. In many cases it is evident that a true tubercular infection takes place.

Lloyd quotes Dr. F. F. Simpson, of Spartanburg, S. C., with reference to an affection of the tonsils among cotton operatives in that State, due to the custom of sucking cotton fiber strongly into the mouth in some processes of their work, as follows:

These fibers become encysted in the crypts of the tonsils, thus becoming a source of constant irritation, and giving rise to what in that section is not inaptly termed "weavers' tonsils."

In a report of the Massachusetts state board of health on dangerous trades a similar practice is commented upon as follows:

A bad, unhygienic habit, common to all weavers who tend old-fashioned looms, is that of drawing the filling through the shuttle eye with the mouth. The weaver puts his mouth close to the shuttle, and, by means of a quick intake of breath, sucks the end of the thread through the shuttle eye, thus drawing into his mouth more or less fine lint and dust, which gives rise to spitting, and sooner or later may cause irritation of the mucous membrane of the throat.

It is explained that the gradual replacement of old-style looms by the Northrup loom, in which after the drum is filled with shuttles the action is entirely automatic, has eliminated this practice mechanically where persuasion and disinterested advice have been of no avail.

The general dust problem in textile factories is discussed in the same report at considerable length, and since the observations are descriptive of present-day conditions in the textile centers of New England, the remarks are quoted almost in their entirety as a most useful contribution to the knowledge of this important branch of occupation disease:

The presence of dust in the air of workrooms is a prominent feature in its influence on health. Aside from dirt and other impurities which may be in the stock, it is the opinion of recognized medical authorities that vegetable dusts are markedly inimical to health. Those operatives in cotton mills who are peculiarly sensitive to unhygienic influences may become seriously affected through the constant irritation of cotton dust or "fly" in the upper air passages, giving rise first to dryness of the throat and later to cough and expectoration. Flax dust is thought to be even more irritating than cotton, while dust in the woolen and silk mills (animal origin) is considered to be less harmful in its effects.

There are many departments in which processes are conducted which expose the employees to dust; but the weaving, spinning, carding, and waste rooms illustrate the important unhygienic conditions commonly associated with this disturbing element. In estimating the effects of dust upon health, the following considerations, among others, are to be borne in mind:

1. Grade of stock used, e. g., quality of cotton.
2. Quantity of dust in a given room.

3. Whether the dust is constant.
4. Type of construction of the room.
5. System of management.
6. Number and kinds of other unhygienic influences present.
7. Means of ventilation.
8. Health and susceptibility of the individual.

In some weave rooms the air is so filled with minute bits of dust as to present a hazy or "smoky" appearance throughout the room, and parts of the room are covered with the small particles which have settled thereon; while other weave rooms are practically free from such dust, there being merely a slight amount of lint or dust of microscopic fineness. Dust in ring-spinning rooms is more constant and is greater in amount than in weave rooms. In a fine-goods mill, in which a high quality of cotton is used in a properly constructed and well-regulated room, the amount of dust present is comparatively unimportant, from the point of view of health. On the other hand, in a coarse-goods mill, where waste stock is used in a low-studded and generally neglected room, the amount, constancy and character of the dust is such as to suggest the probability of real danger.

While in both weave and ring-spinning rooms there are many unhygienic factors, the principal features of the card room are (1) the amount of dust and (2) lack of proper ventilation and effective means of removing the dust. Cotton dust in the card room varies greatly both in quality and quantity. It is always considerable, owing to the carding process of freeing and cleaning the material. In some mills it is enormous in amount, with considerable dirt as a concomitant. The quantity of dust is commonly sufficient to cause a distinct cloudiness of the atmosphere, which, in a room lacking proper ventilation, is a serious menace to the health of the operatives.

It has long been known that work which involves more or less constant confinement in a dusty atmosphere predisposes to the development of diseases of the lungs, especially of pulmonary consumption; but only in recent years, through the science of bacteriology, has the medical profession and the public been enlightened as to the specific cause of consumption, and the method of its dissemination among the susceptible. The people of to-day, therefore, in every walk of life, have a far greater responsibility thrust upon them with respect to minimizing this source of danger by the application of all reasonable sanitary measures. We have to bear in mind, then, in considering the dust problem, the possibility of the presence of "infectious dust" from dried sputum in the air of different mill rooms. Persons suffering from consumption can not always be detected in these rooms, and the habit of indiscriminate spitting involves the possibility of infection.

A comparison of the important constant or possible unhygienic influences in the ring-spinning and carding departments, with emphasis upon the dust in these rooms, is as follows:

RING SPINNING.

1. Considerable dust (constant).
2. "Infectious dust" (dried sputum).
3. Excessive heat (with artificial moisture).

4. Excessive heat (without artificial moisture in some rooms).
5. Lack of provision for a plentiful supply of fresh air.
6. Poor light.
7. Carbon monoxide gas, and excessive amounts of carbon dioxide from respiration and combustion.

CARDING.

1. Dust (abundant and continuous).
2. "Infectious dust" (dried sputum).
3. Lack of provision for a plentiful supply of fresh air.
4. Carbon monoxide gas, and excessive amounts of carbon dioxide from respiration and combustion.

There are, unfortunately, no very satisfactory or trustworthy general vital statistics of the cotton industry in the United States. The vital statistics of the census of 1890 included 1,080 deaths of male textile factory operatives, and of this number 15.4 per cent had attained to ages 65 or over. The general death rates were slightly above the average for the manufacturing class at ages 15 to 25, below at ages 25 to 65, and slightly above the average at 65 years or over. The consumption death rate for textile factory operatives was 2.27 per 1,000, or below the general average, but this in all probability was the result of defective enumeration, partly because of the crude grouping of all textile operatives as a class.

The vital statistics of the census of 1900 included 1,332 deaths of male textile operatives from all causes, and of this number 232, or 17.4 per cent, had attained to ages 65 or over. The death rates generally were below the average for males employed in manufacturing and mechanical industries, except at ages of 65 or over. Out of the 1,332 deaths from all causes, previously referred to, 313, or 23.5 per cent, were from consumption. The corresponding death rate was 2.08 per 1,000, against 2.62 for the manufacturing and mechanical class. The death rate from other respiratory diseases was 1.07 per 1,000 for textile factory operatives, against 1.81 for the manufacturing and mechanical industry class, so that for both consumption and other respiratory diseases the recorded mortality indicates a lesser liability to these diseases than is met with among occupied males in more or less similar employments. These statistics, however, can not be accepted as entirely accurate or conclusive, and they are here included only to call attention to the necessity of extreme caution in accepting the vital statistics of certain occupations where labor conditions materially interfere with the continuity of employment and where the opportunities for change from one occupation to another are rather exceptional.

The available occupation mortality statistics of Rhode Island refer to textile operatives as a class, regardless of the kind of fiber manufac-

tured, which hardly warrants entirely safe conclusions, and the same is true of the corresponding statistics of the Twelfth Census of the United States, which groups mill and factory operatives under textiles, also without distinction of the kind of textile manufactured, such as cotton, wool, flax, jute, etc. The Rhode Island statistics for the period 1897 to 1906 include 798 deaths from all causes, and of this number 218, or 27.3 per cent, were from consumption.

In English occupation mortality statistics cotton textile operatives are combined with persons employed in the manufacture of flax and linen, which also to a certain degree impairs their value. Since the proportion of persons employed in linen and flax manufacture is comparatively small, the error is not a very serious one. In the aggregate the English data for 1890 to 1892 include the observed mortality experience of 538,077 occupied males exposed to the risk of death one year, among whom there occurred 7,471 deaths from all causes. The specific death rates have been calculated by divisional periods of life, and an instructive comparison is possible with the corresponding mortality of occupied males generally.

MORTALITY FROM ALL CAUSES AMONG MALES EMPLOYED IN THE **MANUFACTURE OF COTTON, FLAX, AND LINEN,** COMPARED WITH THAT OF ALL OCCUPIED MALES IN ENGLAND AND WALES, 1890 TO 1892, BY AGE GROUPS.

[From Supplement to the Fifty-fifth Annual Report of the Registrar-General of Births, Deaths, and Marriages in England and Wales.]

Age at death.	Death rate per 1,000 for all occupied males.	Death rate for cotton, flax, and linen employees.		
		Rate per 1,000.	Greater (+) or less (−) than rate for all occupied males.	Ratio to rate for all occupied males.
15 to 19 years	2.55	3.55	+ 1.00	139
20 to 24 years	5.07	5.95	+ .88	117
25 to 34 years	7.29	7.17	− .12	98
35 to 44 years	12.43	12.83	+ .40	103
45 to 54 years	20.66	24.68	+ 4.02	119
55 to 64 years	36.66	52.55	+15.89	143
65 years or over	102.32	159.08	+56.76	155

The mortality of English cotton-mill operatives, including workers in linen and flax, is shown by the preceding table to have been excessive at all ages, except 25 to 34. This is probably the result of the very heavy death rate prevailing at ages under 20, and the comparatively high death rate at ages 20 to 24. The excess in the general mortality of persons employed in this occupation becomes more apparent at ages 45 to 54, and decidedly pronounced at ages 55 or over. It requires no very extended analysis of the causes of death among this class of operatives to establish the fact that the excess in the general mortality is primarily the result of a high death rate from consumption and other respiratory diseases. The facts, as far as they

are obtainable from the published reports, are set forth in tabular form below, which shows the mortality rate by divisional periods of life from consumption and from respiratory diseases other than consumption among cotton mill operatives, including linen and flax, and among occupied males generally, first from consumption and second from other respiratory diseases:

MORTALITY FROM CONSUMPTION AND FROM OTHER DISEASES OF THE RESPIRATORY SYSTEM AMONG MALES EMPLOYED IN THE **MANUFACTURE OF COTTON, FLAX, AND LINEN,** COMPARED WITH THAT OF ALL OCCUPIED MALES IN ENGLAND AND WALES, 1890 TO 1892, BY AGE GROUPS.

[From Supplement to the Fifty-fifth Annual Report of the Registrar-General of Births, Deaths, and Marriages in England and Wales.]

Age at death.	Mortality from consumption.				Mortality from other diseases of the respiratory system.			
	Death rate per 1,000 for all occupied males.	Death rate for cotton, flax, and linen employees.			Death rate per 1,000 for all occupied males.	Death rate for cotton, flax, and linen employees.		
		Rate per 1,000.	Greater (+) or less (−) than rate for all occupied males.	Ratio to rate for all occupied males.		Rate per 1,000.	Greater (+) or less (−) than rate for all occupied males.	Ratio to rate for all occupied males.
15 to 19 years.....	0.70	1.26	+0.56	180	0.26	0.44	+ 0.18	169
20 to 24 years.....	1.95	2.86	+ .91	147	.61	.89	+ .28	146
25 to 34 years.....	2.63	2.91	+ .28	111	1.13	1.24	+ .11	110
35 to 44 years.....	3.43	3.24	− .19	94	2.50	3.41	+ .91	136
45 to 54 years.....	3.38	4.09	+ .71	121	5.15	7.71	+ 2.56	150
55 to 64 years.....	2.65	3.11	+ .46	117	10.32	18.19	+ 7.87	176
65 years or over ..	1.50	2.50	+1.00	167	25.91	53.19	+27.28	205

These earlier statistics have been included, since they will prove useful for reference and comparison with the more recently published occupation mortality data for males employed in this industry, which will subsequently be referred to in detail. The preceding table shows that the mortality from consumption among cotton workers was excessive at all ages except the period 35 to 44, when, however, the rates quite closely approach the average for occupied males generally. More significant are the pronounced differences in the mortality of cotton workers from respiratory diseases other than consumption, which is excessive at all ages and which probably includes some deaths from fibroid phthisis recorded as chronic bronchitis or chronic pneumonia, or under some similar term.

More trustworthy and conclusive are the corresponding statistics of cotton manufacture for England which have been recently made public for the three years ending with 1902 and which are referred to in the Supplement to the Sixty-fifth Annual Report of the Registrar-General, in part as follows:

In the term of life from the twentieth to the forty-fifth year the death rates of cotton workers are below the standard for occupied and retired males; but at other ages they exceed it. In the main working

time of life the comparative mortality figure for the industry is 1,114, or 11 per cent above the standard. Cotton operatives experience an excess of about one-fourth in the mortality from nervous and respiratory diseases, and also a slight excess from cancer, phthisis, circulatory diseases, Bright's disease, and suicide. Their mortality from influenza is less than the normal; they appear to be but slightly addicted to intemperance, and their mortality figure from accident is little more than half the standard.

The English occupation mortality statistics for males employed in cotton manufacture during the three-year period 1900 to 1902 include 5,710 deaths from all causes. Of this number of deaths 1,093, or 19.1 per cent, were from consumption, and 1,084, or 19.0 per cent, from respiratory diseases other than consumption; of the deaths from all causes 2,177, or 38.1 per cent, were therefore from diseases of the lungs and air passages. In the following table a comparison is made of the mortality from all causes among men engaged in cotton manufacture with that of occupied males generally, and the result indicates an excessive mortality at ages 45 or over, and also a slightly excessive mortality at ages 15 to 19. At ages 20 to 44 the mortality among cotton workers was somewhat less than for all occupied males.

MORTALITY FROM ALL CAUSES AMONG MALES EMPLOYED IN **COTTON MANUFACTURE,** COMPARED WITH THAT OF ALL OCCUPIED MALES IN ENGLAND AND WALES, 1900 TO 1902, BY AGE GROUPS.

[From Part II, Supplement to the Sixty-fifth Annual Report of the Registrar-General of Births, Deaths, and Marriages in England and Wales.]

Age at death.	Death rate per 1,000 for all occupied males.	Death rate for male cotton workers.		
		Rate per 1,000.	Greater (+) or less (−) than rate for all occupied males.	Ratio to rate for all occupied males.
15 to 19 years	2.44	2.68	+ 0.24	110
20 to 24 years	4.41	4.32	− .09	98
25 to 34 years	6.01	5.48	− .53	91
35 to 44 years	10.22	9.61	− .61	94
45 to 54 years	17 73	20.46	+ 2.73	115
55 to 64 years	31.01	41.15	+10.14	133
65 years or over	88.39	127.31	+38.92	144

In the table which follows the mortality from consumption and from respiratory diseases other than consumption among men employed in cotton manufacture is compared with the normal mortality for all occupied males from these diseases by divisional periods of life. The comparison shows that the mortality from consumption was above the average at all ages except 25 to 34, when the mortality was practically the same for cotton workers as for all occupied males. The excess in the mortality is quite pronounced at ages 45 or over. The mortality from other respiratory diseases was somewhat excessive at all ages except 35 to 44, but the excess was most pronounced at ages 20 to 24 and at 45 or over.

MORTALITY FROM CONSUMPTION AND FROM OTHER DISEASES OF THE RESPIRATORY SYSTEM AMONG MALES EMPLOYED IN **COTTON MANUFACTURE**, COMPARED WITH THAT OF ALL OCCUPIED MALES IN ENGLAND AND WALES, 1900 TO 1902, BY AGE GROUPS.

[From Part II, Supplement to the Sixty-fifth Annual Report of the Registrar-General of Births, Deaths, and Marriages in England and Wales.]

Age at death.	Mortality from consumption.				Mortality from other diseases of the respiratory system.			
	Death rate per 1,000 for all occupied males.	Death rate for male cotton workers.			Death rate per 1,000 for all occupied males.	Death rate for male cotton workers.		
		Rate per 1,000.	Greater (+) or less (−) than rate for all occupied males.	Ratio to rate for all occupied males.		Rate per 1,000.	Greater (+) or less (−) than rate for all occupied males.	Ratio to rate for all occupied males.
15 to 19 years.....	0.54	0.82	+0.28	152	0.24	0.25	+ 0.01	104
20 to 24 years.....	1.55	1.65	+ .10	106	.48	.60	+ .12	125
25 to 34 years.....	2.03	2.01	− .02	99	.77	.81	+ .04	105
35 to 44 years.....	2.74	2.89	+ .15	105	1.66	1.51	− .15	91
45 to 54 years.....	3.04	3.66	+ .62	120	3.32	4.18	+ .86	126
55 to 64 years.....	2.16	2.76	+ .60	128	6.54	9.80	+ 3.26	150
65 years or over...	1.11	2.13	+1.02	192	17.77	28.50	+10.73	160

Summarizing these observations and statistical data, they indicate a somewhat excessive mortality, particularly at the more advanced ages, undoubtedly due to the inhalation of vegetable fiber dust, the health-injurious effects of which are more slow to reveal themselves than when the inhalation is of metallic and mineral dusts. The statistics available suggest the necessity of a thorough and qualified investigation to determine with more accuracy the facts regarding the mortality of cotton workers.

TEXTILE SPINNERS.

Spinning, in cotton and woolen manufacture, is peculiarly an employment of women and children, who constitute the large majority of persons employed in American and foreign mills. It is true, as pointed out in the census report on cotton manufacture, that in proportion as the speed of machinery increases women and children are displaced by men,[a] but even under modern conditions out of 55,488 frame spinners employed in the manufacture of cotton textiles only 10,709 were men, or 19.3 per cent. Of the remainder, 25,701 were women and 19,078 children. Mule spinners are almost invariably men, but the number of mule spinners in the cotton industry is not large, and in 1905 was only 4,866, of whom 3,691 were employed in the New England States.[b] In spinning the amount of visible dust is not considerable, but large quantities of fly or flue are produced during the spinning, twisting, and drawing operations, which rapidly accumulate on and about the machines, requiring constant cleaning and dust removal, for which practically no effective provision is made in most of the American mills at the present time. The

[a] Census of Manufactures, 1905, Part III, p. 30.

[b] Census of Manufactures, 1905, Part III, p. 50.

employment has the serious disadvantage of a comparatively high and moist temperature, which, according to Arlidge, during the summer months induces "exhaustion, sweating, and debility; results the more felt because spinning entails nearly constant standing, or slight movements to and fro to follow the 'mule frames.'" Arlidge observed, further, that "what renders the spinning rooms more insanitary than they would be otherwise, considering their general spaciousness, is that the temperature is maintained night and day, and that all inlets for air are kept carefully closed. In consequence, there is not the necessary renewal of air for healthy breathing. Moreover, in such close rooms the operatives acquire a particular sensitiveness to currents of air and to change of temperature, and are themselves opposed to most attempts at ventilation. Happily, these remarks are not so generally applicable as they were formerly, for the better recognition of what constitutes ventilation, together with the skill of engineers, has worked a great reform in the sanitary state of spinning rooms." The mortality from consumption among spinners is known to be high, both among men and women, and, no doubt, in a large measure this is the direct result of the employment. The degree of consumption frequency among spinners, however, is possible of a material reduction under satisfactory conditions of light, temperature, and ventilation. Modern American cotton mills, especially in the South, are in many respects more hygienic than the old type granite structures typical of New England. Compared with certain foreign countries, the mortality of cotton spinners, at least, would appear to be somewhat lower in the United States, due, no doubt, largely to the more recent development of the industry and the generally more satisfactory conditions of labor and life in this country.

The only really trustworthy general mortality statistics of spinners are the returns for Blackburn, England, prepared annually under the direction of Dr. Alfred Greenwood, the medical officer of health. An admirable analysis of these returns by Mr. F. S. Crum was published in the New York Medical Record for August 11, 1906, and from the tables there presented are extracted the following comparative death rates of spinners and weavers, including separately the rates for consumption and for other respiratory diseases:

MORTALITY OF **SPINNERS AND WEAVERS** IN BLACKBURN, ENGLAND, 1889 TO 1905.

Age at death.	Death rate per 1,000 from all causes of—		Death rate per 1,000 from consumption among—		Death rate per 1,000 from other diseases of the respiratory system of—	
	Spinners.	Weavers.	Spinners.	Weavers.	Spinners.	Weavers.
15 to 24 years	5.3	3.7	1.3	1.1	0.8	0.4
25 to 34 years	7.7	4.8	2.5	2.4	1.9	.7
35 to 44 years	10.3	9.1	2.8	1.9	2.2	1.8
45 to 54 years	25.7	14.9	2.4	1.8	7.9	4.8
55 to 64 years	43.7	44.7	.8	2.8	17.8	15.1
65 years or over	177.7	139.5	1.8	.9	48.8	35.6

In the State of Rhode Island, during the five years ending with 1906, there were recorded only 71 deaths of male spinners, and of this number 18, or 25.4 per cent, were from consumption, and 5, or 7 per cent, were from other respiratory diseases. It is quite probable, however, that the actual mortality was greater than the recorded on account of the difficulty in securing, without special inquiry, accurate information as to decedents' exact occupation at the time of death.

The recorded industrial insurance mortality statistics of spinners include 189 deaths from all causes, of which 56, or 29.6 per cent, were from consumption. Of the mortality of spinners from respiratory diseases other than consumption, 17 were from pneumonia, 6 from asthma and bronchitis, and 5 from less frequent respiratory diseases. If the deaths from consumption and from other respiratory diseases are combined, 44.4 per cent of the mortality of spinners was from diseases of the lungs and air passages. Spinners, as grouped for the purpose of this investigation, include spinners of textiles generally, but chiefly those in the cotton industry. Because of the fact that the large majority of spinners are women, the mortality experience with this class of labor is comparatively small. The excess in the consumption mortality of spinners is more clearly brought out in the tabular presentation of the proportionate mortality from this disease by divisional periods of life. Although the consumption mortality was excessive at all ages under 55, the excess was most pronounced at ages 25 to 34, when out of every 100 deaths from all causes 50 were from consumption, against a normal expected proportion of 31.3. The analysis of the consumption mortality of spinners in detail is set forth in the table below:

PROPORTIONATE MORTALITY FROM CONSUMPTION AMONG **SPINNERS,** 1897 TO 1906, COMPARED WITH THAT OF ALL MALES IN THE REGISTRATION AREA OF THE UNITED STATES, 1900 TO 1906, BY AGE GROUPS.

[Figures for spinners from experience of an industrial insurance company; figures for males in registration area computed from mortality statistics of the United States census.]

Age at death.	Deaths of spinners, 1897 to 1906, due to—		Per cent of deaths due to consumption among—	
	All causes.	Consumption.	Spinners.	Males in registration area, 1900 to 1906.
15 to 24 years	28	13	46.4	27.8
25 to 34 years	38	19	50.0	31.3
35 to 44 years	36	16	44.4	23.6
45 to 54 years	27	7	25.9	15.0
55 to 64 years	37	1	2.7	8.1
65 years or over	23	.....	.....	2.7
Total	189	56	29.6	14.8

The preceding statistical data, including the industrial insurance mortality experience, confirm the conclusion that the mortality of spinners from consumption is considerably above the average throughout practically the entire active working period of life, but in particular between the ages of 15 and 54, inclusive.

TEXTILE WEAVERS.

Weaving is a more arduous occupation than spinning, but apparently the health conditions affecting this employment are more favorable than the corresponding conditions in the spinning rooms. Spinning attracts the less physically strong or those who because of their frail physique would be predisposed to consumption. This, in part, no doubt, accounts for the difference in the mortality rates of the two employments. The census of 1905 returned the number of weavers of cotton goods in the United States as 98,807, but of these 50,559 were women and young persons.[a] Arlidge describes the conditions in weaving rooms, with special reference to health-injurious circumstances, in part, as follows:

Weaving sheds are of vast dimensions, and, in some instances, hold 1,000 looms. The noise in the winding and spinning rooms is very great, but in the huge weaving sheds it is almost deafening. At the same time, the places are excessively hot; and the air is charged with moisture, and, when there is heavy sizing, with dust of china clay, the same material as used in making pottery. Added to these insanitary circumstances are bodily exhalations of the workers—breath and perspiration. The heat and moisture are necessary to prevent the undue breakage of the yarn in the act of weaving, and the more so where the yarn is of inferior quality and is heavily sized, to make it marketable.

Conditions in American weaving rooms are probably somewhat better than in England, especially on account of the fact that the sizing used in the preparation of the warp is, as a rule, of common starch, sago, or some similar vegetable compound, instead of china clay dust, which is in common use in English factories. The weaving rooms in American mills are usually high-studded but rarely as well ventilated as would be necessary to secure the best conditions favorable to health and life. Effective artificial ventilation is the exception rather than the rule. The conditions as to temperature and artificial humidity are probably less favorable in weaving rooms than in spinning rooms, but in the latter a considerable amount of fly or dust is generated during the spinning processes. English mortality statistics of weavers indicate a lesser liability to consumption and other respiratory diseases among this class than among spinners, but it must always be taken into account that such statistics are likely to

[a] Census of Manufactures, 1905, Part III, p. 50.

err seriously with advancing age when it becomes very difficult to account for those who have retired from the textile industry to follow other and less arduous employments. It is open to question whether the recent English attempt to account for the entire mortality of all the occupied and retired in certain specified trades really has been a success and warrants the conclusions arrived at.

In the analysis by Mr. F. S. Crum of the mortality of spinners and weavers a comparison is made of the death rate of English weavers with the general average death rate in the registration area of the United States, which is reproduced here to emphasize how even an admittedly imperfect registration of the mortality of this trade indicates a decidedly high death rate among this class:

PROPORTIONATE MORTALITY OF **WEAVERS** FROM CONSUMPTION AND OTHER RESPIRATORY DISEASES, BLACKBURN, ENGLAND, 1899 TO 1905.

Age at death.	Per cent of deaths due to consumption among weavers in—		Per cent of deaths due to other respiratory diseases among weavers in—	
	Blackburn, England.	United States registration area, 1900.	Blackburn, England.	United States registration area, 1900.
15 to 24 years	28.9	30.9	10.8	9.5
25 to 34 years	50.6	32.4	14.0	10.4
35 to 44 years	20.8	22.6	19.3	12.2
45 to 54 years	12.1	13.3	32.0	13.4
55 to 64 years	6.4	7.6	33.7	14.6
65 years or over	.6	2.9	25.5	14.7

The Rhode Island statistics of mortality by occupation only record the deaths of weavers, beginning with the year 1901. During the period 1901 to 1906 the recorded mortality of weavers from all causes was 259, and of this number 67, or 25.9 per cent, were from consumption and 30, or 11.6 per cent, from other respiratory diseases. Of the total mortality 97, or 37.5 per cent, were from diseases of the lungs and air passages.

The recorded industrial insurance mortality statistics of weavers include 915 deaths from all causes, of which 254, or 27.8 per cent, were from consumption. Of the mortality of weavers from respiratory diseases other than consumption 78 were from pneumonia, 10 from asthma, 18 from bronchitis, and 13 from less frequent respiratory diseases. If the deaths from consumption and from other respiratory diseases are combined, 40.8 per cent of the mortality of weavers was from diseases of the lungs and air passages. The number of deaths of weavers under consideration is exceptionally large and strictly representative of this important occupation. It is difficult, however, to determine the kind of dust exposure to which this class of labor was most

subject, since the term is a general one, including employments in every branch of textile manufacture. The excess in the consumption mortality of weavers is more clearly brought out in the tabular presentation of the proportionate mortality from this disease by divisional periods of life. While the consumption mortality was excessive at all ages, the excess was most pronounced at ages 25 to 34, when out of every 100 deaths from all causes 53.4 were from consumption, against a normal expected proportion of 31.3. If the proportionate mortality of weavers is compared with the corresponding mortality of spinners, it appears that while for spinners the proportion was 46.4 per cent at ages 15 to 24 it was 39.8 per cent for weavers; at ages 25 to 34 the proportion was 50.0 per cent for spinners, against 53.4 per cent for weavers; at ages 35 to 44 the proportion was 44.4 per cent for spinners, against 38.1 per cent for weavers, and at ages 45 to 54 the proportion was 25.9 per cent for spinners, against 25.7 per cent for weavers. At ages 55 or over the numbers for spinners are too small for an entirely safe conclusion. The comparison would warrant the opinion that the occupation of spinners is somewhat more exposed to health-injurious conditions, resulting in a somewhat higher proportionate consumption mortality from this employment. The analysis of the consumption mortality of weavers in detail is set forth in the table below:

PROPORTIONATE MORTALITY FROM CONSUMPTION AMONG **WEAVERS,** 1897 TO 1906, COMPARED WITH THAT OF ALL MALES IN THE REGISTRATION AREA OF THE UNITED STATES, 1900 TO 1906, BY AGE GROUPS.

[Figures for weavers from experience of an industrial insurance company; figures for males in registration area computed from mortality statistics of the United States census.]

Age at death.	Deaths of weavers, 1897 to 1906 due to—		Per cent of deaths due to consumption among—	
	All causes.	Consumption.	Weavers.	Males in registration area, 1900 to 1906.
15 to 24 years	108	43	39.8	27.8
25 to 34 years	174	93	53.4	31.3
35 to 44 years	155	59	38.1	23.6
45 to 54 years	144	37	25.7	15.0
55 to 64 years	137	15	10.9	8.1
65 years or over	197	7	3.6	2.7
Total	915	254	27.8	14.8

The preceding observations and mortality statistics, including the insurance experience, confirm the conclusion that the mortality of weavers from consumption is excessive at all ages, but in particular at ages 15 to 64, or throughout the entire period of the active working lifetime of persons employed in this occupation.

MANUFACTURE OF HOSIERY AND KNIT GOODS.

The manufacture of hosiery and knit goods has within recent years attained to very large proportions in the United States, giving employment to 103,715 wage-earners in 1905, of whom 66.4 per cent were women and 9.3 per cent children and young persons under 16 years of age. The rapid growth of this industry is illustrated by the fact that during the five years ending with 1905 the number of wage-earners increased 24.4 per cent, while the value of the product increased 43 per cent. The number of knitting machines during the same period increased from 69,047 in 1900 to 88,374 in 1905.[a] About one-third of these are automatic circular hosiery machines, but the amount of dust generated during knitting processes is practically the same, irrespective of the kind of machinery in use. The material used in knitting and hosiery manufacture is chiefly cotton and woolen and worsted yarn, but considerable quantities of shoddy, jute, hemp, silk, and mohair are also used in an endless variety of combinations, which vary widely from year to year, according to the demands of the trade. It has seemed best, however, for the present purpose to include the manufacture of hosiery and knitted goods under the employments exposing chiefly to the risk of vegetable dust inhalation, since over one-half of the material used is cotton or some other vegetable fiber. The health conditions in knitting and hosiery mills conform quite closely to those of cotton and woolen spinning and weaving rooms. The health-injurious effects of the industry are probably most pronounced in the spinning, weaving, knitting, finishing, calendering, and drying rooms, but no qualified investigation has been made to warrant final conclusions.

There are no official vital statistics of hosiery and knit goods manufacture for the United States, and thus far no analysis has been made of the mortality of this class in the cities and towns where the industry is concentrated and where large numbers are employed. The Rhode Island statistics for knitters are not of determining value, since only 8 deaths of male knitters have been recorded during the ten years ending with 1906, but of this small number 5, or 62.5 per cent, were deaths from consumption.

The mortality of hosiery workers in England and Wales is referred to in the Supplement to the Sixty-fifth Annual Report of the Registrar-General, as follows:

The death rates of hosiery workers exceed the standard for occupied and retired males at ages 20 to 25 and 55 years and upward, while at other ages the rates are below the standard. In the main working period of life the comparative mortality figure is 921, or 8 per cent below the standard. The mortality from phthisis exceeds the average

[a] Census of Manufactures, 1905, Part III, p. 68.

by one-fifth part, and there is also a slight excess from cancer, circulatory diseases, and suicide, whilst from every other cause the mortality is below the standard; the mortality from influenza, from alcoholism and liver disease, from Bright's disease, and from accident, shows a marked defect as compared with the average.(a)

The English occupation mortality statistics for persons employed in hosiery manufacture are of considerable value, since they include 881 deaths from all causes occurring during the three-year period ending with 1902. Of this number of deaths 97, or 11 per cent, were from consumption, and 161 deaths, or 18.3 per cent, from other respiratory diseases, which combined give 29.3 per cent of the mortality from diseases of the lungs and air passages. In the table which follows a comparison is made of the mortality from all causes among men in this group with that of occupied males generally, and the result is suggestive of conditions in this trade decidedly unfavorable to health and life at ages 55 or over:

MORTALITY FROM ALL CAUSES AMONG MALES EMPLOYED IN **HOSIERY MANUFACTURE,** COMPARED WITH THAT OF ALL OCCUPIED MALES IN ENGLAND AND WALES, 1900 TO 1902, BY AGE GROUPS.

[From Part II, Supplement to the Sixty-fifth Annual Report of the Registrar-General of Births, Deaths, and Marriages in England and Wales.]

Age at death.	Death rate per 1,000 for all occupied males.	Death rate for males in hosiery manufacture.		
		Rate per 1,000.	Greater (+) or less (−) than rate for all occupied males.	Ratio to rate for all occupied males.
15 to 19 years	2.44	1.00	− 1.44	41
20 to 24 years	4.41	5.75	+ 1.34	130
25 to 34 years	6.01	5.39	− .62	90
35 to 44 years	10.22	6.71	− 3.51	66
45 to 54 years	17.73	16.10	− 1.63	91
55 to 64 years	31.01	35.11	+ 4.10	113
65 years or over	88.39	132.12	+43.73	149

The death rates of men employed in hosiery manufacture are below the general average at all ages under 55 except at ages 20 to 24, when, however, small numbers are in part responsible for a possibly accidental fluctuation in the death rate.

In the table which follows the mortality from consumption and from respiratory diseases other than consumption among men employed in hosiery manufacture is compared with the normal mortality of occupied males from these diseases by divisional periods of life. The comparison shows that the mortality from consumption was above the average at all ages under 65 except at 35 to 44. The re-

(a) Part II, Supplement to the Sixty-fifth Annual Report of the Registrar-General of Births, Deaths, and Marriages in England and Wales, p. xc.

turns are not entirely conclusive and are possibly impaired by the more or less fluctuating character of the population and the tendency to leave the manufacture of hosiery for other branches of the textile industry. The mortality from other respiratory diseases was below that of all occupied males at all ages under 65.

MORTALITY FROM CONSUMPTION AND FROM OTHER DISEASES OF THE RESPIRATORY SYSTEM AMONG MALES EMPLOYED IN **HOSIERY MANUFACTURE,** COMPARED WITH THAT OF ALL OCCUPIED MALES IN ENGLAND AND WALES, 1900 TO 1902, BY AGE GROUPS.

[From Part II, Supplement to the Sixty-fifth Annual Report of the Registrar-General of Births, Deaths, and Marriages in England and Wales.]

Age at death.	Mortality from consumption.				Mortality from other diseases of the respiratory system.			
	Death rate per 1,000 for all occupied males.	Death rate for male hosiery workers.			Death rate per 1,000 for all occupied males.	Death rate for male hosiery workers.		
		Rate per 1,000.	Greater (+) or less (−) than rate for all occupied males.	Ratio to rate for all occupied males.		Rate per 1,000.	Greater (+) or less (−) than rate for all occupied males.	Ratio to rate for all occupied males.
15 to 19 years	0.54	0.60	+0.06	111	0.24	0.20	−0.04	83
20 to 24 years	1.55	2.35	+ .80	152	.48	.26	− .22	54
25 to 34 years	2.03	2.46	+ .43	121	.77	.70	− .07	91
35 to 44 years	2.74	2.48	− .26	91	1.66	.75	− .91	45
45 to 54 years	3.04	4.23	+1.19	139	3.32	2.93	− .39	88
55 to 64 years	2.16	3.47	+1.31	161	6.54	6.01	− .53	92
65 years or over	1.11	.79	− .32	71	17.77	27.06	+9.29	152

The recorded industrial insurance mortality statistics of hosiery and knitting mill employees include only 65 deaths from all causes, of which 24, or 36.9 per cent, were deaths from consumption. The excess in the consumption mortality of hosiery and knitting mill employees is clearly brought out in the tabular presentation of the proportionate mortality from this disease by divisional periods of life.

PROPORTIONATE MORTALITY FROM CONSUMPTION AMONG **HOSIERY AND KNITTING MILL EMPLOYEES,** 1897 TO 1906, COMPARED WITH THAT OF ALL MALES IN THE REGISTRATION AREA OF THE UNITED STATES, 1900 TO 1906, BY AGE GROUPS.

[Figures for hosiery and knitting mill employees from experience of an industrial insurance company; figures for males in the registration area computed from mortality statistics of the United States census.]

Age at death.	Deaths of hosiery and knitting mill employees, 1897 to 1906, due to—		Per cent of deaths due to consumption among—	
	All causes.	Consumption.	Hosiery and knitting mill employees.	Males in registration area, 1900 to 1906.
15 to 24 years	23	5	21.7	27.8
25 to 34 years	22	15	68.2	31.3
35 to 44 years	7	2	28.6	23.6
45 to 54 years	9	2	22.2	15.0
55 to 64 years	3	.....	.....	8.1
65 years or over	1	.....	.....	2.7
Total	65	24	36.9	14.8

It is found, in summarizing these observations and statistical data, that they do not warrant final conclusions but suggest the necessity of a qualified and extended investigation to determine with accuracy the facts regarding the mortality of this class of labor.

LACE MANUFACTURE.

Lace making in the United States has not as yet attained to considerable proportions, but the perfection of machinery for lace making gives promise of a considerable development of this industry in the United States in the future. The subject has attracted the attention of the Bureau of Manufactures, and a very interesting descriptive report on machine-made lace in Europe was recently published by the Department of Commerce and Labor. According to this report lace making by machinery is an extremely complicated process, with resulting labor conditions quite closely resembling those of hosiery and knit-goods manufacture. No very satisfactory account of the conditions of labor in this industry has been published, with special reference to the different employments, except lace dressing, which is held to be accompanied by serious health-injurious consequences, but chiefly on account of the high temperature under which this process is carried on. In a special report upon lace dressing, by the medical officer of health of the city of Nottingham, England, this process in its relation to health is in part described as follows:

The lace, after having been bleached, and, in some cases, dyed, and then dipped in starch solution, is taken in rough and wet condition to the dressing (or drying) rooms (usually over 100 yards long by 15 to 20 yards wide and 9 to 10 feet high) and there stretched upon horizontal frames to dry. In the case of some fine silk nets, the unstarched fabric is placed upon the drying and stretching frames, and the dressing applied to the stretched material on the frames. The dressing rooms are heated by steam or hot-water pipes, and their temperature usually ranges, in this country, from 75° to 100° F. It is made to vary to suit the requirements of different materials and according to the condition of the external air. In very hot and dry weather, all artificial heat is occasionally dispensed with for cotton goods; but for silk goods, which are reputed to require specially quick drying, artificial heat is always employed, and the temperature of some silk-lace dressing rooms in Lyon (France) is said often to be as high as between 130° and 140° F. The drying process is assisted by large revolving fans placed directly over the drying material.

The Stenter dressing or drying machine calls for special mention, as its use frequently modifies the distribution of hot air in the rooms where it is employed. In this machine, which is used principally for lace curtains, the fabric is carried by an endless chain into an atmosphere heated by multitubular boilers (the air being driven through the steam-heated boiler tubes), and the whole mechanism, with its

contained lace material, is usually boxed in with wooden casing furnished with ventilating openings. In rooms where this machine is in use, the temperature seldom rises above 80° F., except in the immediate neighborhood of these openings and at the feeding end of the machine.

The investigation at Nottingham was a thoroughly qualified inquiry, including a careful consideration of the available vital statistics referring not only to those who had been continuously employed in lace dressing, but also to those who had been casually employed; the number of the latter was found to be considerable. Many of the lace factory employees were interviewed and examined, but the opinion was practically unanimous that lace dressing, even if followed for many years, is not dangerous to health. Many of the employees were found to suffer a good deal from common colds, but such colds did not appear to be of greater frequency than among factory workers in general. The investigation did not disclose any special tendency to phthisis or to other lung diseases among the women, who alone work continuously in the dressing room, and this in the opinion of Dr. Philip Boobbyer, the author of the report, was more remarkable, since the majority were of a very poor class, living in poor houses and poor neighborhoods, and many no doubt led irregular and intemperate lives. The result of the investigation was summed up in the statement that—

Probably the strongest argument in support of the contention that lace dressing, as now carried on in Nottingham, is a healthy occupation, is to be found in the fact that large numbers of women have worked at it for very long terms of years continuously, have had good health while doing so, and have lived to advanced old age, either at work or in retirement. I have alluded elsewhere to the question which naturally arises, as to how far the case of these women is to be regarded as an illustration of the survival of the fittest, but up to this point have answered it only by general statements.

Although, as I have said, there are a good many people who have left this work for various causes after having tried it for a time, there are, on the other hand, large groups of those who have taken it up and adhered to it continuously during the whole period of their working lives, and the duration of these has certainly, in the majority of cases, been remarkably long. The only possible inference to be drawn from facts and figures like these is that the work people have established an absolute tolerance of the abnormal atmospheric conditions which exist in the lace-dressing rooms, and that life, and vigorous life, can be maintained to old age under these conditions.

Since lace dressing as carried on in England is practically a woman's employment, males employed in the lace industry generally did not come within the scope of the inquiry. Dr. Boobbyer, however, pointed out that the death rate from phthisis among the males was found to be high in contrast to the low death rate from phthisis

among the females, but owing to the smallness of the number of men employed, and the continual fluctuation in this number, the expression of their phthisis mortality by means of a definite rate would, because of this fact, be seriously misleading.

Lace making in its relation to health was considered at some length by Arlidge, who first calls attention to the gradual changes from the rapid displacement of handmade lace by machine-made lace, and the decay of the industry in Nottingham, which, in his opinion, from a purely hygienic point of view was not an unmixed evil on account of the high ratio of phthisis and scrofula observed by him to prevail among those who followed this occupation. He refers to the occupation divisions in machine-made lace, chiefly lace making proper, finishing, and mending, the last named process being subdivided into dressing, gauffering, bleaching, and dyeing. The process of gauffering is, in his opinion, a particularly injurious one to health, chiefly on account of the fact that the machines are heated by gas. He states that—

It is a division of the occupation which is regarded on all hands as very unhealthy, chiefly on account of the very great heat connected with it and, in less measure, of a sickly smell evolved. The "finishing" of cotton lace entails a higher temperature than that of silk lace. The same fact applies when "Paris" dressing is done. The presence of a large surface of moist tissue and the elevation of temperature necessarily imply a more or less humid atmosphere and free perspiration. Fortunately the admission of fresh air is permissible at times from open windows. For the most part finishing rooms are heated by hot water or steam pipes, though in some factories open fires are found in the making-up departments; the air is dry, and the making-up machines, heated by gas or by steam pipes, render it very hot, especially when several of them are situated in the same apartment.

A summary of these conclusions of qualified observers seems to warrant the opinion that dust, in relation to lace manufacture, is reduced to a minimum and apparently is not of a serious consequence to the employees. This opinion is confirmed by English vital statistics, which indicate that the death rates from phthisis are at least not above the average, and at some divisional periods of life they are decidedly below the average of consumption frequency in other branches of textile manufacture.

The most recent English mortality statistics of lace manufacture are for the three years ending with 1902, referred to in the Supplement to the Sixty-fifth Annual Report of the Registrar-General in part as follows:

The number of male lace workers is comparatively small, and it is found that as compared with the standard for all occupied and retired males, the death rates at the several groups of ages fluctuate considerably, being below that standard at ages 20 to 25 and 35 to 55,

and above it at all other ages. In the main working time of life the comparative mortality figure is 950, or 5 per cent below the standard. Lace workers appear to suffer little from influenza and respiratory diseases, and only half the ordinary fatality from accident. They show, however, a marked excess in the mortality from cancer, and the mortality from alcoholism and liver disease as well as from phthisis, from nervous and circulatory diseases and from suicide also exceeds the standard.(a)

The recent English mortality statistics for lace workers are not quite conclusive and do not warrant an entirely definite opinion as to the health injurious effects of this employment. In the table which follows, a comparison is made of the mortality from all causes among men in this group with that of occupied males generally, and the comparison shows that the general death rate of lace workers was above the average at ages 15 to 19, 25 to 34, and 55 to 64. Since the number of men employed in this industry is comparatively small the statistical data do not warrant final conclusions.

MORTALITY FROM ALL CAUSES OF MALE **LACE WORKERS,** COMPARED WITH THAT OF ALL OCCUPIED MALES IN ENGLAND AND WALES, 1900 TO 1902, BY AGE GROUPS.

[From Part II, Supplement to the Sixty-fifth Annual Report of the Registrar-General of Births, Deaths, and Marriages in England and Wales.]

Age at death.	Death rate per 1,000 for all occupied males.	Death rate for male lace workers.		
		Rate per 1,000.	Greater (+) or less (−) than rate for all occupied males.	Ratio to rate for all occupied males.
15 to 19 years	2.44	2.58	+0.14	106
20 to 24 years	4.41	2.69	−1.72	61
25 to 34 years	6.01	6.71	+ .70	112
35 to 44 years	10.22	8.38	−1.84	82
45 to 54 years	17.73	11.68	−6.05	66
55 to 64 years	31.01	32.56	+1.55	105
65 years or over	88.39	87.56	− .83	99

The preceding table is self-explanatory and requires no further comment. A more extended comparison is made in the next table, in which the mortality of lace workers from consumption is compared with the normal mortality of occupied males generally, by divisional periods of life. The comparison shows that the mortality from consumption was excessive at the same age periods at which the general death rate was above the normal, but the excess was not very marked and does not warrant a decidedly unfavorable conclusion regarding the possible health-injurious effects of this industry.

(a) Part II, Supplement to the Sixty-fifth Annual Report of the Registrar-General of Births, Deaths, and Marriages in England and Wales, p. lxxxviii.

MORTALITY FROM CONSUMPTION AMONG MALE **LACE WORKERS**, COMPARED WITH THAT OF ALL OCCUPIED MALES IN ENGLAND AND WALES, 1900 TO 1902, BY AGE GROUPS.

[From Part II, Supplement to the Sixty-fifth Annual Report of the Registrar-General of Births, Deaths, and Marriages in England and Wales.]

Age at death.	Mortality from consumption.			
	Death rate per 1,000 for all occupied males.	Death rate for male lace workers.		
		Rate per 1,000.	Greater (+) or less (−) than rate for all occupied males.	Ratio to rate for all occupied males.
15 to 19 years	0.54	1.13	+0.59	209
20 to 24 years	1.55	1.12	− .43	72
25 to 34 years	2.03	2.84	+ .81	140
35 to 44 years	2.74	2.39	− .35	87
45 to 54 years	3.04	2.57	− .47	85
55 to 64 years	2.16	2.22	+ .06	103
65 years or over	1.11	.74	− .37	67

For a final and entirely conclusive opinion additional information is required, but at present no trustworthy statistical data are available for the United States.

FLAX AND LINEN MANUFACTURE.

The manufacture of flax, hemp, and jute products in the United States is only gradually assuming large proportions, considering the enormous demand for the finished product. The United States Census of Manufactures of 1905 enumerates 24,508 wage-earners employed in this industry, but of this number only 12,343 were adult males, while 10,072 were women and 2,093 children under 16 years of age. As pointed out in a report on this industry by Mr. Edward Stanwood, expert special agent of the census, "Hardly any general class of manufactures is more difficult of treatment, either as a whole or in detail, than that of flax, hemp, and jute. The materials are closely allied, in that they are all vegetable fibers, and in that two and sometimes all three are used in the same establishment and not infrequently introduced into the same fabric. Yet the products are so diverse, ranging from gunny bags and ships' hawsers to fine toweling and sewing thread, that the propriety of embracing all these varied industries in a single class, which seems so evident when materials only are considered, practically disappears." "A list of the products includes yarn and twine made from each one of the three fibers; linen thread; woven fabrics, partly or wholly of linen; rope and binder twine of manila or of sisal, or of the two mixed; gunny bagging, jute burlaps, carpets, rugs, and other minor products."[a]

[a] Census of Manufactures, 1905, Part III, p. 187.

Of these products the manufacture of cordage and twine and of jute and jute goods will be separately considered, so that it is only necessary here to refer briefly to linen manufacturers and important processes necessary for the manipulation of flax. The linen manufacture is a very limited one in the United States, since the census only enumerates 15 establishments, giving employment to 3,811 wage-earners, and of this number only 1,260, or 33.1 per cent, were adult males. As stated in the census report, "Relatively little attention is given to the preparation of the flax fiber for manufacture, and that which is prepared is adapted only to the coarser processes. Imported material is employed almost exclusively in the spinning of yarns and the weaving of fabrics in the United States. There has never been a successful attempt in this country to produce fine goods at a profit."(a)

The material used in linen and thread manufacture is the fibrous portion of the flax plant, which, in this country, for reasons which do not require to be discussed, is chiefly cultivated for the seed. The preliminary processes are pulling, threshing, and retting, necessary to prepare the flax straw for the breaking and scutching processes. The scutching process, whether by hand or machinery, is an exceedingly dusty occupation, subject, however, to material modification by effective ventilation stacks which carry off much dust which would otherwise pollute the atmosphere of the room. With the subsequent processes begins the linen manufacture proper, and the first operation is called "heckling," which also may be performed either by hand or machinery. Heckling is also an exceedingly dusty process, and the conditions are not much better in the subsequent operation of sorting. Spreading and drawing are intermediary processes, previous to the sliver being taken to the roving frame, after which the fiber is ready for spinning, which for practical purposes conforms to the mule spinning operations in cotton mills, although the amount of dust generated during this process is probably greater. Spinning is followed by reeling, drying, warping, sizing, beaming, and drawing in, previous to the final process of weaving, all of which are operations practically indentical with the corresponding process in cotton manufacture.

Referring to the health-injurious circumstances of particular employments in flax and linen manufacture, Bevan, in his treatise on Industrial Classes and Industrial Statistics of the United Kingdom, gives a very vivid descriptive account, which is reproduced in part as follows:

Heckling, which is performed by girls and boys, is always a very dusty operation, and requires a good deal of continuous labor. In the

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[a] Census Manufactures, 1905, Part III, p. 191.

report of Bridges and Holmes, it is said that "the ill effects of the heckling efforts upon the boys (technically called machine boys) engaged in it are shown in spasmodic attacks of cough, during which the boy generally holds on to the machine to assist the efforts of coughing; an effort so familiar to workers that a boy who is observed doing so is said to be 'poucey,' from the 'pouce' or dust by which the cough is provoked. This dust is both fibrous and granular, but the latter very largely preponderates. It is for the most part a fine, soft, and palpable powder, proceeding evidently in great part from the putrefying process to which the flax plant has been subjected. Mixed with these organic particles there is, doubtless, a considerable portion of pulverized mud." This peculiar affection is spoken of as being very common in the Belfast mills.(a)

In the preparation of the flax a separation is made of the short and coarse fiber, which is known as tow and which contains the largest quantity of dust, dirt, and woody fiber. Bevan states that after being sorted tow "is carded just like cotton, except that it is on a rougher scale, and makes infinitely more dust. The tow-carding room is the worst place in the mill, and the clothes of the workers are generally loaded with the dust which floats thickly through the room, notwithstanding the adoption of powerful exhaust fans in the roof or the external walls. What with the dust and the damp from the steam jets, it is the most unhealthy employment in flax spinning; but, though efforts have been repeatedly made to induce the women to wear respirators, it has been without success."

The dusty condition of the workrooms in tow manufacture is not, however, the only objectionable feature in this branch of the industry, for in the practice of wet spinning the rove of the tow is drawn through a trough of warm water, which results not only in an exceedingly warm atmosphere, but also a very damp one, owing to the spray which is sent off from the spindles. Unless atmospheric conditions are regulated with great care the health of employees is seriously affected, particularly in the case of women. The following quotation gives the opinion of Bevan regarding the injurious conditions in the manufacture of flax products:

The flax trade is the most unhealthy, and no person should work in it who has any pulmonary weakness. Doctor Purdon says, in his evidence, that "nearly three-fifths of those that die annually in this trade are taken off by diseases of the respiratory organs. In the preparing rooms, the death rate from chest affections is exceedingly high, being 31 per 1,000, and amongst the hecklers the deaths annually amount to 11.1 per 1,000, amongst the weavers to 9 per 1,000. In wet spinning the children often get their clothes wet with the spray that comes off from the spindles, and on coming out of the hot room with their clothes damp in the evening, it brings on bronchial affec-

(a) In this connection reference may be made to the recently published report of the Belfast Health Commission to the Local Government Board of Ireland, p. 95. Dublin, 1908.

tions." The same observer states that the average life of flax carders is 45.7 years, and the average length of time employed 16.8 years; of preparers, average of employment, 28.7; of dressers, average of employment, 16.6. From an analysis of the fiber it seems that 100 parts of flax contain 13 of silica. From the preceding facts it would appear that the Belfast mills are not in that state of sanitary arrangement in which they ought to be.[a]

These statistical references must be used with caution, since they refer to an earlier period, when conditions were less satisfactory than they are at the present time.

The unfavorable conclusions of Bevan regarding the health-injurious conditions in flax and linen manufacture are fully sustained by numerous investigations which have been made during the last fifty years. The earliest qualified inquiry was made by Doctor Greenhow, and was included in the privy council's medical report for 1860. Doctor Greenhow's report is of special value in that attention is called to the differences in the health-injurious quality of different kinds of flax dust, and from his observations the following extract is made:

Of the several processes carried on in flax mills, hackling, carding, and line preparing are more or less dusty, so that the atmosphere of the rooms in which they are going on is loaded with dust in proportion to the quality of the flax that is being manufactured and the means employed to prevent the dispersion of the dust into the air and its inhalation by the operatives. Several varieties of flax, named from the places whence they come, are manufactured in this country. The most common are the Dutch, Baltic, Irish, French, and Flemish, which yield dust in the process of manufacture in the order in which they have been named, the Dutch being the most, the Flemish the least, dusty. Flax is also imported from America and India, both of which varieties are said to be very dusty. There are, moreover, several varieties of each kind of flax which differ materially from one another; and it is said that, independently of other circumstances, the mode of preparing the flax causes a difference in the dustiness of the article when it comes to be manufactured, that which has been prepared by exposure to rain upon the grass being less dusty than such as has been steeped in water. The manufacture of the refuse from the hackle, called tow, which is spun into coarser material, is likewise attended by much dust. The danger to health will differ in different manufactories, according as the least or the most dusty kind of flax is manufactured. Several operatives asserted that they had not suffered sensibly in health from their occupation until they worked in Dutch flax, when the inhaling of the dust soon caused bronchial irritation. Of the several above-named processes, hand hackling is the most pernicious; this process has now been partially superseded by machine hackling, which, though still often injurious to the health of the operatives, is decidedly less so than the former. There is likewise a considerable quantity of dust

[a] Bevan's The Industrial Classes and Industrial Statistics, Volume on Textiles and Clothing, p. 44.

given off in the processes of carding and line preparing, from which the operatives suffer in proportion to its amount.

After emphasizing the great value of an effective system of ventilation, Greenhow includes a discussion of the pathology of dust inhalation in flax and linen factories, which is one of the most valuable references on the subject, and which, in part, reads as follows:

The effects of exposure to the dust of flax are manifested upon the mucous membranes. The stomach is very apt to become deranged by the dust swallowed, and hence the flax operatives, more particularly the hacklers, often suffer from dyspepsia, and are sallow and look sickly; the eyes often become sore, the margins of the eyelids being swollen and inflamed, and the sight is said occasionally to become impaired. But the most serious effect is produced on the mucous membrane of the air passages; oppression of the chest, followed by dyspnœa, cough, and eventually by expectoration, are ordinary results of inhaling air charged with the dust of flax. Epistaxis is an occasional, and hæmoptysis a very frequent consequence of the same cause. It is remarkable that dyspnœa, sometimes of an asthmatic character, often long precedes the accession of cough and expectoration, or perhaps, more properly speaking, the cough and expectoration are in the beginning too slight to attract the notice of the sufferer, whilst the dyspnœa reminds him of its presence whenever he attempts brisk locomotion. As has already been said, many of the flax operatives forsake the occupation at an early age on account of the injurious influence it exercises over the health; but though this is true, the injury to health is commonly very gradual, and constant discomfort and serious disease only become established toward middle life, men employed in any dusty department of the manufacture rarely attaining the age of 45 or 50 years without suffering more or less severely from bronchial disease.

Efforts to induce workmen and women to use respirators had been a failure, although out of 107 persons medically examined 79 were suffering from some degree of bronchial irritation, ascribed to the unhealthy nature of the employment. While some had attained to quite advanced age, Greenhow points out that—

Notwithstanding that men at ages so advanced as 60 years and upward are sometimes found working as hand hacklers, the attainment of this age must, from the all but universal statements of both employers and operatives, be deemed exceptional. It was stated by manufacturers, foremen, overlookers, and the operatives themselves that working in the more dusty departments of the manufactory rarely fails to make itself felt toward middle life, few persons being able to work in an atmosphere loaded with the dusty particles for twenty years continuously without sustaining serious injury to health. The health of the women employed in the line-preparing room of another factory was inquired into in the manner adopted with regard to the hacklers, already mentioned. It is always difficult to obtain direct evidence from female operatives; but the inquiry showed that all those who had worked for a considerable length of time in this branch of manufacture were asthmatical, and that several of them had suffered from haemoptysis. The operatives employed in the

carding rooms, unless the machines be properly protected to prevent the dispersion of the dust, frequently labor under habitual dyspnœa, cough, and expectoration; and it is especially in the carding rooms that the operatives are accustomed to tie up their mouths to prevent them inhaling the dust. The effect on a healthy stranger of entering these rooms is most unpleasant; the dust floating in the atmosphere irritates the nasal and bronchial passages, producing sneezing and a sense of oppression in the chest, which do not cease until some time after the visitor has left the apartment. The manager of a large factory asserted that remaining for any continuance in one of the carding rooms invariably produced in him, for a time, all the symptoms and sensations of catarrh.(a)

While the observations of Greenhow pertain to an early period, they apply to present-day conditions, although some improvement has been brought about in the meantime as the result of rational factory legislation. The continuous observation of actual conditions and the frequent qualified inspections made by medical inspectors of flax and linen factories in the United Kingdom have warranted from time to time modifications in the rules governing the conditions of employment, and these were finally amended in 1906 with special reference to processes of spinning and weaving flax and tow and the processes incidental thereto. Among other provisions, it is required that "in every room in which roughing, sorting, or hand hackling is carried on, and in every room in which machine hackling, carding, or preparing is carried on, and in which dust is generated and inhaled in a quantity calculated to cause injury to the health of the employees, a sufficient exhaust should be provided to insure that the dust is drawn away from the workmen at or as near as possible to the point at which it is generated." These regulations governing flax and linen manufacture in the United Kingdom at the present time were carried into effect upon the results of a special investigation made by Hamilton P. Smith, one of His Majesty's superintending inspectors of factories, of the conditions of work in flax and linen mills as affecting the health of operatives employed therein, and from which, in part, the following is quoted, with special reference to the dust problem.

In roughing, sorting, and machine and hand hackling rooms, and in all preparing rooms, the source of danger to health lies chiefly in the fact that large quantities of dust of an injurious nature are generated in the processes of manufacture, and accumulated testimony shows that the workers suffer in health. The raw material after leaving the scutch mill is subjected to the process of combing, laying parallel, and sorting the fibres of flax. This is done partly by hand and partly by machinery. Taking a rough handful or strick of rough flax, the operative by a swinging motion dashes the fibers onto the vertical needles forming the rougher or hackle. The

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(a) Privy Council Medical Report, 1860, pp. 148–152.

fiber is drawn through these teeth, separating inferior and short fibers from the better ones and leaving "tow" as the residual. The subsequent processes of hand hackling and sorting are, so far as our purposes are concerned, practically the same. The amount of dust varies according to the condition of the material, but in all much of an injurious nature is given off.(a)

The report calls attention to the fact that even at the present time in not a single instance, either in hand-hackling rooms or in machine-hackling rooms, are respirators provided for the use of workmen, and it is suggested that a special rule be adopted making it mandatory that "suitable and efficient respirators shall be provided for the use of the persons employed in roughing, sorting, hand or machine hackling, preparing, and carding." In the inspector's opinion, "Cloth of open texture, made of fine yarn of woolen material, capable of being easily washed, makes an excellent respirator, which can be worn with advantage and without discomfort."

A special investigation into the conditions of work in flax and linen mills, including a thoroughly qualified scientific analysis of the air in flax mills, was made by the Pathological Laboratory of Louvain, the center of the flax industry in France. This investigation proved that the chief constituent of flax dust is mineral matter, the proportionate amount of which varies with the condition of the flax in the different processes, being largest during the process of carding, where it was found to be about four times as large in flax dust as in the outside atmosphere. In addition, it was ascertained that the number and proportion of micro-organisms in flax dust were enormously in excess of the corresponding proportion found in the outside atmosphere, the excess being most pronounced in the dust produced during the hand hackling. The dusty processes in the order of their importance were determined by this investigation to be, first, carding; second, machine hackling; third, preparing; and fourth, hand hackling. Those containing the largest amount of micro-organisms, in the order of their importance, were, first, hand hackling; second, carding; third, machine hackling; fourth, preparing; fifth, spinning; and sixth, reeling. The cause of the injurious nature of the flax dust previously referred to as being very largely of mineral origin was ascertained to be the considerable proportion of silica. The health-injurious conditions in the different rooms were discussed briefly, as follows:

The hackling rooms, both hand and machine, are described as very dusty. Their condition explains the ill health of the workers and the rapid elimination of the workers which takes place. As an additional cause, reference is made (with quotations from the writings of

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(a) Report upon the Conditions of Work in Flax and Linen Mills, by Hamilton P. Smith, p. 10. London, 1904.

the late Dr. C. D. Purdon, of Belfast, and Doctor Arlidge) to the arduous nature of the work in the machine-hackling rooms, the nature of the work not admitting of a moment's relaxation on the part of the boys employed.

The carding rooms are described as so dusty that the workers appear to work constantly in a mist. It is held to be the most unhealthy occupation from which results a rapid elimination of workers, only those of strong constitution being able to continue at it. Despite this, the unhealthy nature of the work leads to illness frequently and causes others to abandon the work. The average duration of employment is the shortest, and yet the sickness among the workers is the greatest. As possibly causing the dust of the carding rooms to be more injurious than that of any other, reference is made to the metal particles which must be present in the air from the wearing away by friction of the numerous teeth on the carding machines.

Work in the preparing rooms is not considered to be comparable as regards injury to health with those described, and it is pointed out that the figures as to the amount of dust and of micro-organisms present in the air are to some extent vitiated by the fact that carding and preparing are sometimes carried on in the same room.

Reeling is not an injurious occupation; what injury to health there is arises from the humidity of the atmosphere. As a subsidiary cause of ill health in these rooms, is the fact that some of the machines are only capable of being kept in motion by the foot being pressed continually on a bar underneath the machine. This necessitates continuous strain on the muscular system.[a]

It is a matter of regret that there should be no very conclusive statistical data regarding the apparently very serious health-injurious effects of linen and thread manufacture, and in the absence of such data, especially for the United States, no definite and conclusive opinion would be warranted, although the general observations sustain the conclusion that the labor conditions in this industry are very far from being what they should be to reduce the health-injurious effects of the various employments to a minimum.

HEMP AND CORDAGE MANUFACTURE.

The manufacture of cordage ranks first in the group of miscellaneous textile products, but the industry never has attained to as large proportions in the United States as the home market alone would seem to warrant. With the introduction of machinery the earlier ropewalks have nearly disappeared and conditions otherwise

[a] Report upon the Conditions of Work in Flax and Linen Mills, by Hamilton P. Smith, appendix 7, pp. 22, 23. London, 1904.

in this employment have undergone material changes. In the ropewalks very common to an earlier period it was the practice, according to Clark, for a man to walk forward and backward, spinning from the hemp around his waist, the twist being imparted from a wheel turned by a boy. Occasionally this practice is still followed at the present time. That the employment was more or less injurious to health is pointed out by Thackrah, and commented upon in Hall's Journal of Health in 1832, where it is stated that "ropewalkers suffer inconvenience from their stooping position." In the modern rope factory the twist is imparted by rapidly rotating machinery similar to that used in textile mills generally, making it possible, in the words of Clark, "to spin a rope several thousand feet in length on an upright apparatus occupying but a few square feet."

The descriptive account of the processes and circumstances under which the work is carried on fully sustains the view that a not inconsiderable amount of dust is generated during practically every important process, and without question more or less to the injury of the health of the employees. In discussing the hygiene of this occupation much emphasis is placed upon the specific processes necessary for the successful preparation of the hemp, flax, jute, and other fiber. The subject is referred to in a special report of the Massachusetts state board of health, which is in fact the only really trustworthy account of present-day conditions in this employment. Referring to the manufacture of cordage, twine, carpet yarn, and gunny bags the report states that:

The raw material in various forms comes in bales, which are opened and shaken apart, and the contents are then treated according to their nature. Ordinary jute and hemp, after being shaken out, are run through softening machines, in which they are moistened with an emulsion of oil and water, preparatory to carding. Old rope, gunny bagging and twine are run through machines which pick the fibers apart as a preliminary to other processes. Opening, picking, softening and carding are processes which are exceedingly dusty, and the dust is very irritating to the air passages. The machines which straighten and twist the fibers also give rise to much dust.

Arlidge reports upon the conditions in this employwment as follows:

The manufacture of rope and other cordage, formerly carried on after a primitive fashion in "ropewalks," to be found in every town, has become greatly transformed by the introduction of machinery. The great rope-making establishment at Belfast has almost annihilated every ropewalk in Ireland, and seems in a fair way of doing the same thing for England.

The hemp, Russian or Manila, is worked on the same general lines as flax. It has first to be sorted and picked over by girls, handroughed and heckled, then carded and a sliver formed, which, after a certain degree of twisting in the roving frames, is submitted to the spinning machines. Both the wet and dry processes are used, the

former principally for the fine yarn. The spun yarn is next taken to large tanks of boiling tar, through which it is slowly passed; this done, the superfluous tar is pressed out between iron rollers, and the yarn afterwards slowly dried. The next business is the twisting of the yarn into strands, on the old ropewalk principle, but by the aid of machines. Cord made from harsh fibers has to undergo a scouring process, prior to sizing and polishing, to fit it for market.

This outline of the processes conveys the general hygienic features of rope making, and at two points at least, viz, in the sorting and the heckling and preparing rooms, the evil of dust arises just as in working flax for linen, in no small degree, with its inevitable consequences to the respiratory organs.

Parry also refers to this occupation, and with special reference to health-injurious consequences incidental to the manufacture of rope or cordage. He points out that—

Hemp is used for ropes, cords, and carpets. The manufacture is much the same as jute. No heckling machines are used. In carpet making the hemp is cut into 12-inch lengths, oiled, and then scutched, carded, and arranged in slivers. The coarse fibers and woody matters are removed, and the rest converted into tow. The slivers are made into large bales, which are again passed through the finishing card, by which fresh tow is separated. Wool is also an important ingredient in this industry. After the hempen foundation is made, short-fibered coarse wool, wound on bobbins, is woven in. All these processes produce dust of hemp and wool; especially is this noticed during the emptying of the tow box, and also during the dressing process, particularly of hemp imported into this country.

The hemp must be sorted and picked over, hand roughed and heckled; then carded and a sliver formed, twisted and spun either by the wet or dry process. In all the early stages, especially sorting and heckling, dust is produced just as it is in linen making.

Contrasting present-day conditions in rope manufacture with the earlier and very primitive processes common to all ropewalks, it is somewhat doubtful whether the change to the almost universal use of machinery has been really a benefit to the occupation. The necessity of walking forward and backward in the old-fashioned ropewalk no doubt was of great value as a matter of mere physical exercise, but no conclusive observations have been made a matter of record which would warrant a definite opinion as to whether conditions at the present time in ropewalks are better or worse than those prevailing at former periods.

The occupation mortality statistics of cordage workers are limited to English sources since no data have been made public regarding the mortality of this occupation in the United States. The number of male wage-earners employed in this industry in the United States in 1905 was 8,646, a sufficient basis for a safe generalization if the necessary mortality data were available. The reference to the mortality of rope makers in the Supplement to the Sixty-fifth Annual

Report of the Registrar-General for the three years ending with 1902 is in part as follows:

The number enumerated in this occupation was only 6,255 at the last census, the number being too small to warrant detailed examination. As compared with the standard for occupied and retired males the death rates fluctuate widely. In the main working time of life the comparative mortality figure is 910, or 9 per cent less than the standard, and under each heading except phthisis they suffer less than the average mortality.(a)

The recent English statistics for this occupation are quite conclusive of the unfavorable effects of the employment on health at ages 20 to 34 and at 55 or over. In the table which follows a comparison is made of the mortality from all causes of men in this group with occupied males generally, and while the differences are not very pronounced at the earlier ages, they indicate the facts at least with approximate accuracy, and the comparison is, therefore, quite suggestive.

MORTALITY FROM ALL CAUSES AMONG MALE **CORDAGE MAKERS,** COMPARED WITH THAT OF ALL OCCUPIED MALES IN ENGLAND AND WALES, 1900 TO 1902, BY AGE GROUPS.

[From Part II, Supplement to the Sixty-fifth Annual Report of the Registrar-General of Births, Deaths, and Marriages in England and Wales.]

Age at death.	Death rate per 1,000 for all occupied males.	Death rate for male cordage makers.		
		Rate per 1,000.	Greater (+) or less (−) than rate for all occupied males.	Ratio to rate for all occupied males.
15 to 19 years	2.44	2.20	− 0.24	90
20 to 24 years	4.41	5.75	+ 1.34	130
25 to 34 years	6.01	6.47	+ .46	108
35 to 44 years	10.22	7.45	− 2.77	73
45 to 54 years	17.73	13.03	− 4.70	73
55 to 64 years	31.01	32.49	+ 1.48	105
65 years or over	88.39	105.86	+17.47	120

The preceding table is self-explanatory and requires no further comment. A more extended comparison, however, is made in the next table, in which the mortality of cordage makers from consumption is compared with the normal mortality of occupied males, by divisional periods of life. The comparison shows that the mortality from consumption is excessive at ages 20 to 34 and 55 or over, or at the same age period at which the general death rate of cordage makers is in excess of the normal mortality of occupied males.

(a) Part II, Supplement to the Sixty-fifth Annual Report of the Registrar-General of Births, Deaths, and Marriages in England and Wales, p. lxxxix.

MORTALITY FROM CONSUMPTION AMONG MALE **CORDAGE MAKERS**, COMPARED WITH THAT OF ALL OCCUPIED MALES IN ENGLAND AND WALES, 1900 TO 1902, BY AGE GROUPS.

[From Part II, Supplement to the Sixty-fifth Annual Report of the Registrar-General of Births, Deaths, and Marriages in England and Wales.]

Age at death.	Mortality from consumption.			
	Death rate per 1,000 for all occupied males.	Death rate for male cordage makers.		
		Rate per 1,000.	Greater (+) or less (−) than rate for all occupied males.	Ratio to rate for all occupied males.
15 to 19 years	0.54	0.24	−0.30	44
20 to 24 years	1.55	2.09	+ .54	135
25 to 34 years	2.03	2.59	+ .56	128
35 to 44 years	2.74	2.48	− .26	91
45 to 54 years	3.04	1.18	−1.86	39
55 to 64 years	2.16	3.77	+1.61	175
65 years or over	1.11	1.50	+ .39	135

The industrial insurance mortality experience of rope makers is limited to 109 deaths from all causes. Of this number, 28, or 25.7 per cent, were from consumption, and 9, or 8.3 per cent, were from respiratory diseases other than consumption. Of the deaths from other respiratory diseases, 6 were from pneumonia, 1 from asthma, and 2 from bronchitis. The following table gives an extended comparison of the mortality of rope makers from consumption with the normal mortality of all males in the registration area of the United States for the seven-year period 1900 to 1906.

PROPORTIONATE MORTALITY FROM CONSUMPTION AMONG **ROPE MAKERS**, 1897 TO 1906, COMPARED WITH THAT OF ALL MALES IN THE REGISTRATION AREA OF THE UNITED STATES, 1900 TO 1906, BY AGE GROUPS.

[Figures for rope makers from experience of an industrial insurance company; figures for males in registration area computed from mortality statistics of the United States census.]

Age at death.	Deaths of rope makers, 1897 to 1906, due to—		Per cent of deaths due to consumption among—	
	All causes.	Consumption.	Rope makers.	Males in registration area, 1900 to 1906.
15 to 24 years	12	6	50.0	27.8
25 to 34 years	18	9	50.0	31.3
35 to 44 years	17	7	41.2	23.6
45 to 54 years	18	6	33.3	15.0
55 to 64 years	24	.....	.....	8.1
65 years or over	20	.....	.....	2.7
Total	109	28	25.7	14.8

These statistics show an excessive mortality from consumption among rope makers, and this excess is specially high at the younger ages. One-half of the total mortality was due to consumption at ages 15 to 24 and 25 to 34, against an expected proportion of 27.8

and 31.3, respectively. While the statistics are limited to comparatively small numbers, the facts are decidedly suggestive of health-injurious conditions in the rope-making industry.

The observations and statistical data regarding the mortality of cordage makers, while not entirely conclusive, indicate with at least approximate accuracy the high degree of consumption frequency at ages 20 to 34 and at 55 or over. It is quite probable that changes in occupation affect the official vital statistics of this trade to a sufficient extent to understate the true effect of the employment on health. There would therefore appear to be unfavorable conditions in this employment, doubtless largely due to the exposure to vegetable fiber dust, resulting in a comparatively high degree of consumption frequency among the employees.

MANUFACTURE OF JUTE AND JUTE GOODS.

The manufacture of jute and jute goods in 1905 gave employment to 6,083 wage-earners, but of this number only 2,437 were men, while 3,083 were women, and 563 were children under 16 years of age.[a] The industry is practically new in the United States, and as yet only a beginning has been made in its development, but it is significant that there has been an increase of 50 per cent in the number of wage-earners employed in the manufacture of jute and jute goods during the five years ending with 1905. No vital statistics have been published for this industry as it is carried on in the United States, but some reference will subsequently be made to the official statistics of Scotland, where the industry has attained to very considerable proportions.

A brief description of jute manufacture was included in Bevan's account of the manufacturing industries of the United Kingdom, and while the description is of somewhat early date it applies to present-day conditions, which in the meantime have not undergone a material change:

> Formerly jute used to be spun as flax, which it resembles in fiber, though much coarser. It was heckled, so as to get as much as possible of the fine fiber, and separate it from the coarse. The latter, however, so greatly predominated that it was found to be a useless expense, and it was, therefore, treated like tow, and placed at once in the carding engine. As it is even coarser than tow, one would naturally think that more dust would arise, and that the trade would surpass the flax trade in unhealthiness; but this is not so, owing to the necessity for saturating the jute with oil, so as to make the coarse and brittle fibers flexible. Its very roughness, therefore, has proved a sanitary safeguard to the workers.

Bevan enumerates 20 subdivisions of labor in jute manufacture, but he does not enlarge upon the health-injurious conditions inci-

[a] Census of Manufactures, 1905, Part III, p. 190.

dental to the different employments. On the whole, however, the subdivisions of labor in jute manufacture correspond to those in textile manufacture generally The most serious factor injurious to health in jute manufacture is the dust problem, which under most favorable circumstances, however, is subject to material modification. The dust of jute under the microscope, according to Oliver, shows "vegetable fibers which are often torn and ragged and therefore with difficulty detached from the bronchial mucous membrane."

The hygiene of this employment has been discussed by various authorities, and an excellent account of the conditions affecting the health of persons employed in jute manufacture in Dundee, Scotland, was contributed to Oliver's "Dangerous Trades," by Mr. Harry J. Wilson, one of His Majesty's inspectors of factories, from which in part the following extracts are made, emphasizing the more dusty processes of this occupation:

The first operation in the process of the manufacture of jute consists in cutting the binding ropes of the bale and opening out the hard, compressed material. This is invariably done by hand, and immediately afterwards the fiber, still in a compressed state, is passed through between four heavy deeply-fluted rollers intersecting each other, which open the material somewhat and facilitate its disentanglement, before it is placed on the feeding table of the softener. During these processes, while the fiber is in a dry condition, a considerable quantity of dust is shaken out, much of it being of a gritty nature and consisting largely of fine particles of the sand or mud in which the plant grows. The latter impurities adhere to the rooty portion of the plant, but becomes dispersed when the fiber is shaken out and disturbed. It is in this dust that tetanus spores have been found in very considerable quantities. * * * As matters at present stand, the preparing operations in jute factories are much more dusty than subsequent processes, but the particles thrown off in carding, drawing, and rove spinning are more of a light, fluffy nature, and prove less irritating to the respiratory organs than the gritty dust evolved in handling the dry jute. After the material has been effectively softened, and while in a slightly moist condition, it is fed into the "breaker" card. Here, owing to the splitting and combing action of the rapidly-running card teeth, many rooty particles and other impurities are removed, but the heavier matter falls below the machines, from which it is taken away periodically, so that only the lighter dust rises and is breathed by the operators.

The operations subsequent to carding evolve little dust relatively, but owing to the excessive speed of spinning-frame flyers and the friction on the yarn, very light, fluffy particles are continually rising in spinning rooms, so that the atmosphere becomes charged with extremely fine portions of fiber. All horizontal surfaces and the clothing and hair of the workers in these departments soon become coated with this dust.

The dirtiest and most objectionable processes in the manufacture of the material are undoubtedly those of preparing and spinning. The remuneration of the operatives in these departments is consider-

ably less than that earned by the weavers. Thus a distinctly lower class of employees engage in the former processes, the more self-respecting taking up weaving as a means of livelihood.

Where the finer qualities of fiber are treated, the amount of dust evolved is comparatively small, and the factories fairly clean; but in the coarser varieties it becomes excessive and the whole premises assume a dirty and objectionable aspect. It may be of interest to observe here that many women engaged in the preparing and spinning operations of jute manufacture habitually snuff, presumably to rid the nostrils of dust. The custom is rarely observed among women outside Dundee.

The prevention of the dispersal of dust in carding and spinning is extremely difficult, for it appears to rise, more or less, from the fiber, wherever it is sufficiently disturbed, and from any number of points, even in one room. Exhaust fans, however, when placed immediately above the softening machines and properly erected, undoubtedly remove much of the fine, gritty particles shaken out of the raw material, and where a hood is arranged above the exact seat of dust production and communicates with a fan, there is little to complain of.

This particular dust from the raw material is most irritating to breathe, and is presumably injurious, but fortunately few persons in any one mill come in contact with it.

To quote further, the following remarks refer to the high temperature and other conditions injurious to health in jute spinning rooms:

Unquestionably the high temperatures of spinning rooms are distinctly harmful, perhaps more so than is usually imagined. In fact, the writer, from close observation of operatives in various parts of the country and in dissimilar industries exposed persistently to warm atmospheres, is of opinion that a general lowering of the health (in certain instances marked) very frequently follows such employment. The effects of constantly breathing warm air, quite apart from the liability to chills which such atmospheres engender, are worthy of closer study and scientific investigation. Certainly exposure to great radiated heat, if the air is not particularly warm, does not affect workmen in a similar manner.

The opinion of Wilson, based upon personal investigation, is to the effect that the weaving of jute is apparently a healthy occupation, judging from the general appearance of the operatives. Most of these operatives are women, including sack sewers, who as a rule present a ruddy and robust appearance. The disease liability of jute workers employed in spinning and preparing rooms to pulmonary diseases is also discussed by Wilson, who incidentally comments upon other factors injurious to health as follows:

Investigations reveal a predisposition among factory workers, and particularly those employed in spinning and preparing rooms, to develop respiratory troubles, broncho-pneumonia, chronic bronchitis, and pulmonary emphysema being the most prominent. There is also a singularly large number of patients admitted to the local infirmary suffering from lobar pneumonia. Rheumatism is an extremely common ailment, and can be partially accounted for by the great variations of temperature which operatives have frequently to withstand.

Multiple tuberculous lesions are frequently observed in the children of the poorer operatives, and thus one finds from time to time young persons at work with portions of the hands amputated on account of scrofulous or tuberculous diseases of the bones. Slight deafness is widespread among jute operatives, but other textile workers may be afflicted in a similar degree. The excessive noise of jute-weaving looms and the persistent loud hum of spinning frames presumably account for much of this. The looms, owing to their large size and the weight and high speed of the shuttles, are particularly noisy. The possibility of the dust inducing the formation of an obstruction with the waxy secretion of the ear is not excluded. Indeed, the fine light particles of fiber readily accumulate in the external auditory canal.

A hoarseness or huskiness of voice is met with frequently, and is especially marked in preparing and spinning operatives. Whether this is due to overstraining of the voice, shouting above the noise of the machinery, or to dust irritation of the vocal chords has never been clearly demonstrated. Anæmia in its commonest forms is a frequent ailment among all the operatives, but doubtless careless and injudicious feeding contributes to this condition of health.

Wilson describes the occurrence of "mill fever," so called, which no doubt contributes in a measure toward a predisposition to respiratory and tubercular diseases, as follows:

An illness locally known as "mill fever" attacks about one-fourth of the persons who commence labor in factories for the first time. The symptoms make their appearance a few days after work is started and take the form of one or more of the following: Headache, backache, lassitude, thirst, and slight fever. The attack lasts about from three to four days and yields to antifebrile medicines, followed by tonics. It has been observed that the patients are usually young people and are frequently of weak constitution or badly nourished.

In summing up his conclusions this authority calls attention to the difficulty of differentiating with accuracy between the health-injurious effects properly to be charged to the industry and the effects of poor feeding and bad housing, which no doubt are of considerable importance in Dundee, since the low physical and social condition of the operatives in jute factories is admitted to be a marked feature of the industry. In conclusion, Wilson refers to the health conditions in jute manufacture in East India, where the industry has developed to large proportions, stating that:[a]

The reports of the inspectors of jute mills in East India show that the industry is considered there to have no particularly deleterious effects on health. The mills, however, are built with very high roofs and are largely open to the sky. The climate permits of this, and accordingly the ventilation gives no trouble. Another fact has to be borne in mind in comparing Indian operatives with those employed at home. The former are migratory, only remaining a year or two at the industry, and, presumably, insufficient time is given for any in-

[a] Mention may also be made here of a recently published report of the East India Factory Labor Commission, Vol. I, Parliamentary Paper CD–4292. London, 1908.

jurious effects to betray themselves; whereas in Scotland the bulk of a lifetime is spent by a worker in a jute factory.

The conclusions of Wilson are fully sustained by other qualified observers, and an account by Arlidge of this employment is included in this review of qualified medical opinions regarding the health-injurious conditions in this industry:

In general principle the processes resemble those in use in making linen, but as the fibers of jute are coarser, longer, and more brittle than those of flax slight differences exist in the mechanical operations. Hackling is, of recent years, not employed, but the jute is at once sent to the carding machine. But what would be a most dusty and injurious operation is rendered comparatively harmless by the previous profuse sprinkling of the jute with water and train oil, for the purpose of rendering the fibers more flexible. This preparatory moistening and softening of the material is an advantage in the subsequent operations of preparing and spinning, by reducing greatly the amount of dust that this harsh substance would otherwise give off. Nevertheless, I have seen jute in the course of spinning give off much coarse dust, and should anticipate that could the statistics of the jute manufacture be got at they would, on the whole, exhibit still more insanitary results than do those of the linen trade.

It is only for Scotland that the vital statistics of workers in jute have been separately recorded, but it is somewhat doubtful whether employment in the industry is sufficiently permanent to warrant final conclusions. During the three years ending with 1892 there occurred in Scotland 132 deaths of jute workers ages 25 to 64, and of this number only 26, or 19.7 per cent, were from consumption. There also occurred 20 deaths from bronchitis, 15 from pneumonia, and 4 from other respiratory diseases, a total of 65 deaths from diseases of the lungs and air passages, or 49.2 per cent of the mortality from all causes. In commenting upon the mortality of persons employed in the manufacture of jute, the Supplement to the Thirty-eighth Annual Report of the Registrar-General of Scotland states that diseases of the respiratory system and phthisis are especially prominent as causes of death, and that to these diseases may be added diseases of the nervous and circulatory systems. If, however, the general death rates of jute workers are compared with the corresponding mortality of males generally, the rates are rather below than above the average except at ages 15 to 19. This rather unexpected result is no doubt due in part to occupation selection, but as has been previously pointed out, the class of labor employed in jute manufacture in Scotland is of a decidedly low order. The details of the mortality for three years ending with 1892 are set forth in the following table, which has been abstracted from the report (p. lxxi) previously referred to:

MORTALITY OF MALE EMPLOYEES IN **JUTE MANUFACTURE** IN SCOTLAND, 1890 TO 1892.

[From the Supplement to the Thirty-eighth Annual Report of the Registrar-General of Births, Deaths, and Marriages of Scotland.]

Age.	Years of life.(a)	Deaths.	Rate per 1,000.	Rate per 1,000 for all employed males.
15 to 19 years	7,077	37	5.23	5.72
20 to 24 years	3,180	25	7.86	7.53
25 to 44 years	5,259	38	7.23	9.98
45 to 64 years	2,568	94	36.60	24.34
65 years or over	441	37	83.90	99.58

[a] The years of life as used in this table means three times the number of employees in jute manufacture enumerated at the census of 1891.

The Supplement to the Forty-eighth Annual Report of the Registrar-General of Scotland, published in 1905, comments at greater length upon this employment, and again the statistical data contradict some of the previously quoted medical conclusions unfavorable to the industry. According to the report, males in jute manufacture experienced death rates at ages 25 to 44 and 45 to 64 below the corresponding death rates of all males in Scotland. At ages 25 to 64 there occurred 145 deaths from all causes among jute workers, and of this number 26, or 17.9 per cent, were from consumption and other tubercular diseases, while 19 were from pneumonia, 12 from bronchitis, and 3 from other respiratory diseases, a total of 60 deaths from diseases of the lungs and air passages, or 41.4 per cent of the mortality from all causes. The facts in detail regarding the general mortality of jute workers, by divisional periods of life, for the three years ending with 1902, are set forth in the table below, which has also been abstracted from the report (p. cxxvii) previously referred to:

MORTALITY OF MALE EMPLOYEES IN **JUTE MANUFACTURE** IN SCOTLAND, 1900 TO 1902.

[From the Supplement to the Forty-eighth Annual Report of the Registrar-General of Births, Deaths, and Marriages of Scotland.]

Age.	Years of life.(a)	Deaths.	Rate per 1,000.	Rate per 1,000 for all employed males.
15 to 24 years	12,213	57	4.67	.....
25 to 44 years	9,294	59	6.35	9.32
45 to 64 years	4,740	86	18.14	26.82
65 years or over	888	61	68.69	.....

[a] The years of life as used in this table means three times the number of employees in jute manufacture enumerated at the census of 1901.

The available statistical data do not warrant a definite conclusion at the present time, but the observed conditions in the industry suggest that the same may safely be classed among the dusty trades more or less injurious to health and predisposing to consumption.

PAPER AND PULP MANUFACTURE.

The manufacture of paper and wood pulp, according to the census of 1905, gave employment to 65,964 wage-earners, the number of which had increased 33 per cent during the preceding five years. The industry is concentrated in large plants, in which, broadly speaking, the conditions of work, with particular reference to disease and exposure to other health-injurious circumstances, are more satisfactory than in small establishments. The industry has undergone a marked change within recent years, and the predominating material used in manufacture now consists of wood pulp, in place of linen rags, which in the past constituted the sole material from which paper was made. Among other materials which are at the present time employed in paper manufacture, aside from wood pulp, are chiefly rags, including cotton and flax waste and sweepings, manila stock, including jute, bagging, rope, waste, threads, and straw, which last is being employed to an increasing extent, including the rice straw of the Southern States.

The most important dust-producing material is rags, which, as a rule, however, are subjected to a preliminary sorting process outside of paper mills. A careful sorting process is necessary to eliminate colored rags, which are not adapted for white paper making, all of which is carried on in the rag and sorting rooms, which form the dustiest section of a paper mill. The sorting and the transfer of the rags to the cylinders in which they are boiled under high pressure with caustic soda are, according to Arlidge, the only important processes in which dust is set free except at the tear-up machines and to a limited extent in the bleaching department, where there is often a diffusion of the dust of bleaching powder, which, however, can be prevented by previously moistening it, which is often the case.

The health-injurious aspects of the industry are referred to in a report of the Massachusetts state board of health to the effect that—

> The operatives engaged in certain of the processes of paper making are exposed to considerable dust from rags used in the manufacture; those engaged in other departments are exposed more or less to wet; and those in still others are exposed to no industrial dangers whatever. The most important department of such a mill, from a sanitary standpoint, is the rag-sorting room. In most of the mills visited provision exists for carrying away, by mechanical ventilation, the dust arising from the handling of the rags; in some, no provision whatever is made. On account of the nature of the raw material, it is generally thought that there is some risk of infection of those who handle the rags, and smallpox is everywhere looked upon as one of the most important possible dangers of the paper industry. It would appear, however, from facts obtainable, that cases of infection traceable to the handling of rags are not common. In some of the establishments, it is said, the rag sorters are seldom sick. In the establishments visited the operatives had generally the appearance of health and strength.

In a subsequent report by the same authority the dust problem in paper manufacture is discussed at greater length, in part as follows:

The materials from which paper is made include rags, burlap, old paper and wood pulp. Rags are derived chiefly from foreign countries, from which they are imported in bales compressed by hydraulic power. These are opened at the mill, and the contents are put into a closed, box-like structure, known as a "beater" or "thresher," containing a large wooden roller with iron "fingers," which revolve several hundred times per minute. This separates the rags and shakes them thoroughly, giving rise to much dust, which falls between the long strips of iron grating beneath the roller into a specially constructed receptacle, which may be cleaned out by hand or by means of an exhaust fan and dust pipe. During this process more or less dust commonly escapes into the room, and in some instances the amount is very great, partly because of the very dirty character of the rags handled. From facts gathered with reference to this process in 80 establishments it appears that, with the usual grade of stock, no matter what kind of "duster" or "thresher" is used, and in spite of exhaust fans and dust pipes, some dust will escape. With high-grade stock certain dusters work very well, while with low-grade stock the results are far from satisfactory. Some very high-grade clean stock gives off little if any dust.

In some mills the dust from the threshers is collected and baled. This work is exceedingly dusty, and the men who perform it are provided with respirators, which they appear to use with far less reluctance than is shown by those to whom they are supplied in other dusty trades.

From the duster or thresher the rags are conveyed by hand or through a chute to the sorting room, where they are sorted on tables with box-like tops provided with bottoms of wire netting, through which dust and fine particles escape to receptacles below.

The most recent English mortality statistics of paper manufacture are for the three years ending with 1902, referred to in the Supplement to the Sixty-fifth Annual Report of the Registrar-General in part as follows:

At ages under 20 years paper makers experience a mortality considerably above, and at ages over 65 years slightly above, the standard for occupied and retired males; at all other ages it is below the standard, the difference being most marked at ages 35 to 55 years. In the main working period of life the comparative mortality figure is 730, or 27 per cent below the standard. The mortality from influenza, alcoholism, and liver disease, and accident is in each case less than half the standard, and under every other heading except suicide there is also an advantage.[a]

The recent English mortality statistics for persons employed in the paper industry do not indicate a very marked effect of this employment on health, but rather to the contrary the general death rate was below the average at ages 20 to 64. In the table which follows

[a] Part II, Supplement to the Sixty-fifth Annual Report of the Registrar-General of Births, Deaths, and Marriages in England and Wales, p. xci.

a comparison is made of the mortality from all causes among men in this group with that of occupied males generally, and the comparison shows that it is only at ages 15 to 19, and 65 or over, that the general death rate of persons employed in paper manufacture exceeds the general average.

MORTALITY FROM ALL CAUSES AMONG **PAPER MAKERS**, COMPARED WITH THAT OF ALL OCCUPIED MALES IN ENGLAND AND WALES, 1900 TO 1902, BY AGE GROUPS.

[From Part II, Supplement to the Sixty-fifth Annual Report of the Registrar-General of Births, Deaths and Marriages in England and Wales.]

Age at death.	Death rate per 1,000 for all occupied males.	Death rate for paper makers.		
		Rate per 1,000.	Greater (+) or less (−) than rate for all occupied males.	Ratio to rate for all occupied males.
15 to 19 years	2.44	3.46	+1.02	142
20 to 24 years	4.41	4.01	− .40	91
25 to 34 years	6.01	5.02	− .99	84
35 to 44 years	10.22	6.66	−3.56	65
45 to 54 years	17.73	11.05	−6.68	62
55 to 64 years	31.01	26.38	−4.63	85
65 years or over	88.39	94.80	+6.41	107

The preceding table is self-explanatory and requires no further comment. A more extended comparison, however, is made in the next table, in which the mortality of paper makers from consumption is compared with the normal mortality of occupied males from this disease, by divisional periods of life. The comparison shows that the mortality from consumption was below the average at all ages.

MORTALITY FROM CONSUMPTION AMONG **PAPER MAKERS**, COMPARED WITH THAT OF ALL OCCUPIED MALES IN ENGLAND AND WALES, 1900 TO 1902, BY AGE GROUPS.

[From Part II, Supplement to the Sixty-fifth Annual Report of the Registrar-General of Births, Deaths, and Marriages in England and Wales.]

Age at death.	Mortality from consumption.			
	Death rate per 1,000 for all occupied males.	Death rate for paper makers.		
		Rate per 1,000.	Greater (+) or less (−) than rate for all occupied males.	Ratio to rate for all occupied males.
15 to 19 years	0.54	0.54	.....	100
20 to 24 years	1.55	1.29	− .26	83
25 to 34 years	2.03	1.95	− .08	96
35 to 44 years	2.74	2.13	− .61	78
45 to 54 years	3.04	1.78	−1.26	59
55 to 64 years	2.16	1.86	− .30	86
65 years or over	1.11	1.02	− .09	92

The foregoing comparison indicates a degree of consumption frequency below the average for paper makers, but the differences are not very pronounced and at certain periods of life are very slight. It is quite probable that occupation changes affect the accuracy of the official vital statistics and that the health-injurious effects of the industry are more serious than is disclosed by an analysis of the available statistical information regarding this employment.

The recorded industrial insurance mortality statistics of paper makers are limited to 115 deaths from all causes, of which 34, or 29.6 per cent, were from consumption. Of the mortality of paper makers from respiratory diseases other than consumption, 9 were from pneumonia and 1 was from bronchitis. There were 44 deaths of paper makers from consumption and from other respiratory diseases combined, or 38.3 per cent of the total mortality was due to diseases of the lungs and air passages. The excess in the mortality of paper makers from consumption is clearly brought out in the tabular presentation of the proportionate mortality from this disease, by divisional periods of life.

PROPORTIONATE MORTALITY FROM CONSUMPTION AMONG **PAPER MAKERS**, 1897 TO 1906, COMPARED WITH THAT OF ALL MALES IN THE REGISTRATION AREA OF THE UNITED STATES, 1900 TO 1906, BY AGE GROUPS.

[Figures for paper makers from experience of an industrial insurance company; figures for males in the registration area computed from mortality statistics of the United States census.]

Age at death.	Deaths of paper makers, 1897 to 1906, due to--		Per cent of deaths due to consumption among—	
	All causes.	Consumption.	Paper makers.	Males in registration area, 1900 to 1906.
15 to 24 years	13	6	46.2	27.8
25 to 34 years	28	15	53.6	31.3
35 to 44 years	18	7	38.9	23.6
45 to 54 years	15	2	13.3	15.0
55 to 64 years	23	3	13.0	8.1
65 years or over	18	1	5.6	2.7
Total	115	34	29.6	14.8

While according to this table the consumption mortality of paper makers was excessive at all ages except 45 to 54, the excess was most pronounced at ages 15 to 44. At ages 15 to 24, out of every 100 deaths from all causes, 46.2 were from consumption, against 27.8 expected; at ages 25 to 34 the proportion was 53.6, against 31.3 expected; and at ages 35 to 44 the proportion was 38.9, against 23.6 expected.

CABINETMAKERS.

The occupation of the cabinetmaker is a well-defined and separate branch of carpentry practically limited to the manufacture of furniture, and men in this employment are often separately classified as furniture makers and repairers. Occasionally the classification in-

cludes upholsterers, but since the exposure to health-injurious conditions is essentially different in the two occupations, such a grouping is not in conformity to the conditions under which the two employments are carried on. The census of 1900 returns the number of cabinetmakers at 35,641, but in addition the number of persons employed in furniture manufacture was 23,078. In the vital statistics of the census of 1900, however, cabinetmakers and upholsterers are combined into one group, but the mortality returns were limited to the registration States, giving the combined number of the two employments for known ages 15 years or over as 24,695. Among this number there occurred during the census year 446 deaths from all causes, or at the rate of 18.06 per 1,000 per annum, against a general average for all occupations of only 15.16. The mortality from consumption among cabinetmakers and upholsterers, according to the census, was excessively high, or 3.59 per 1,000, against 2.37 for all occupations, and 2.62 for the manufacturing and mechanical industries class. The consumption mortality of cabinetmakers and upholsterers was also decidedly in excess of the corresponding mortality of carpenters and joiners. While the consumption mortality rate for cabinetmakers and upholsterers was 3.59 per 1,000, as previously stated, the corresponding rate for carpenters and joiners was 2.31. It is also of interest to note that while among cabinetmakers and upholsterers the proportion of persons of ages 65 or over was 6 per cent, the corresponding proportion for carpenters and joiners was 7.9 per cent. If the two employments had been separately returned the value of the data would have been very materially increased. It is quite safe to assume, however, that of the two occupations, that of the upholsterer is more injurious to health than the employment of the cabinetmaker.

Qualified medical opinion is divided as to the health-injurious effects of the continuous inhalation of wood dust, but it is generally agreed that the dust of hard wood is more injurious than the dust of soft wood, and that the most injurious of all is the dust of so-called satinwood, or African boxwood, which, however, is used in only very limited quantities for special purposes, which will be referred to again under wood turners and other woodworkers subsequently to be mentioned.

Ramazzini held the opinion that workers in wood do not suffer any serious inconvenience on account of their employment, except those working in cypress, which produces headache, an opinion which does not seem to be confirmed by extensive experience in our numerous cypress shingle mills. At least no qualified medical opinion has been made a matter of record, to the effect that employees in cypress mills are subject to particularly injurious conditions. Thackrah, writing in 1832, refers to health-injurious consequences among men

working in particular kinds of hard wood, and his opinion is here quoted, since it was fully confirmed by subsequent experience. "Cabinetmakers suffer from the dust when they saw African, cam, rosewood, and Spanish mahogany. The first of these is most injurious. Its dust produces sneezing, headache, sickness, and sometimes vomiting. This wood, however, is rarely used."

B. W. Richardson, M. D., also commented upon wood dust as more or less injurious to health and as a substance injurious to the lungs, stating that—

The dusts of some kinds of wood, to which turners of wood and fine cutters of wood are exposed, are causes of much irritation of the lungs and of bronchial cough. The dust is fine and penetrating, and when it is from colored wood it imparts its own peculiar color to the bronchial secretion. I have seen these phenomena, markedly in the case of mahogany carvers, in those who carve ornaments for couches and other articles of furniture. The work gives rise to a great quantity of wood dust, which is constantly inhaled. In carving, the artisan has to keep up a blowing process with the lips in order to blow away the small portions of wood which he removes with the chisel. This process is very wearying, but the chief complaint made by the worker is of the dust he draws back in inhalation. The mischief is greatly increased in the rooms where the ventilation is imperfect. The cough is usually attended with copious secretion from the bronchial tubes, and I have more than once known the loss from this cause so copious as to cause other symptoms of wasting and exhaustion allied to phthisis pulmonalis and constituting what has been called bronchial phthisis. As a rule, however, those who suffer from this form of disease recover when they are removed from their occupation and are placed in favorable circumstances for recovery.

More recent observations are by Parry, who refers to the employment of cabinetmakers, but who, in particular, considers the process of sandpapering and the resulting mixture of mineral with organic dust. In his opinion, "carpenters, joiners, turners, and cabinetmakers are exposed to the risks of breathing in wood dust; but the lung-disease death rate—337 compared with 402 for all males—does not seem to prove that much harm is caused by its inhalation."

Tracy refers very briefly to the occupation, and after stating that dust of vegetable origin is on the whole quite harmless, holds, regarding the effect of wood dust in particular, as follows: "The workmen who inhale vegetable dust do not as a rule suffer in consequence. The dust of wood, in particular, is so harmless that it seems more appropriate to speak of cabinetmakers and carpenters under another heading, as their attitude while at work has more to do in bringing on disease than the atmosphere they breathe. The dust of the hard woods, as mahogany, rosewood, etc., may cause slight irritation of the larynx and trachea and a tendency to bronchial catarrh."

The annual reports of English factory inspectors contain frequent references to the health-injurious effects of African boxwood, or so-called satinwood, rosewood, etc., but since the manufacture of small articles in which this wood is used brings the employment more properly within the group of wood turners and carvers, the peculiar effects of the dust of this wood on health will there be considered in more detail.

As previously stated, the United States census returns combine the mortality of cabinetmakers with that of upholsterers; and the only official vital statistics are for the State of Rhode Island for the decade ending with 1906. The number of deaths of cabinetmakers recorded was only 50 from all causes, and of this number 12, or 24 per cent, were from consumption. The number of deaths from respiratory diseases other than consumption among men in this occupation was 9, which, combined with the mortality from consumption, returned 21 deaths from diseases of the lungs and air passages, or 42 per cent of the mortality from all causes. The corresponding percentage of deaths from consumption and from other respiratory diseases for all males in Rhode Island was 30.3 per cent.

The most recent English mortality statistics of cabinetmakers are for the three years ending with 1902, referred to in the Supplement to the Sixty-fifth Annual Report of the Registrar-General, in part as follows:

> Cabinetmakers suffer more severely than all occupied and retired males at ages under 20 and above 65, but at all intermediate ages the death rates are below the standard, while at every stage of life they exceed those of carpenters. In the main working period the comparative mortality figure of cabinetmakers is 956, or 5 per cent, below the standard. They suffer less than the average from influenza, alcoholism, and liver disease, as well as from diseases of the nervous, circulatory, and respiratory systems; the mortality from accident is also low. On the other hand, among these workers both cancer and phthisis are more fatal than the average, and suicide is more common.[a]

The recent English mortality statistics for cabinetmakers are not quite conclusive as to the generally unfavorable effects of this industry on health. In the table which follows a comparison is made of the mortality from all causes among men in this group with that of occupied males generally, and while the returns are not entirely conclusive they are suggestive of more or less unfavorable circumstances connected with the employment, since at ages 35 to 64 the departure from the normal is very slight and probably to a not inconsiderable extent the result of occupation changes more or less likely to impair the value of the available statistical data.

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[a] Part II, Supplement to the Sixty-fifth Annual Report of the Registrar-General of Births, Deaths, and Marriages in England and Wales, p. lxxx.

MORTALITY FROM ALL CAUSES AMONG **CABINETMAKERS**, COMPARED WITH THAT OF ALL OCCUPIED MALES IN ENGLAND AND WALES, 1900 TO 1902, BY AGE GROUPS.

[From Part II, Supplement to the Sixty-fifth Annual Report of the Registrar-General of Births, Deaths, and Marriages in England and Wales.]

Age at death.	Death rate per 1,000 for all occupied males.	Death rate for cabinetmakers.		
		Rate per 1,000.	Greater (+) or less (—) than rate for all occupied males.	Ratio to rate for all occupied males.
15 to 19 years	2.44	2.61	+0.17	107
20 to 24 years	4.41	3.73	— .68	85
25 to 34 years	6.01	5.20	— .81	87
35 to 44 years	10.22	9.84	— .38	96
45 to 54 years	17.73	17.34	— .39	98
55 to 64 years	31.01	30.65	— .36	99
65 years or over	88.39	82.99	—5.41	94

The preceding table is self-explanatory and requires no further comment. A more extended comparison is made in the next table, in which the mortality of cabinetmakers from consumption is compared with the normal mortality of occupied males from this disease, by divisional periods of life. The comparison shows that the mortality from consumption was excessive at all ages, but in marked contrast to a low general death rate at ages 20 to 64. The corresponding death rates from consumption were excessive for cabinetmakers at all ages 15 or over. While the excess was not very marked, the departure from the normal is quite significant at ages 35 to 44.

MORTALITY FROM CONSUMPTION AMONG **CABINETMAKERS**, COMPARED WITH THAT OF ALL OCCUPIED MALES IN ENGLAND AND WALES, 1900 TO 1902, BY AGE GROUPS.

[From Part II, Supplement to the Sixty-fifth Annual Report of the Registrar-General of Births, Deaths, and Marriages in England and Wales.]

Age at death.	Mortality from consumption.			
	Death rate per 1,000 for all occupied males.	Death rate for cabinetmakers.		
		Rate per 1,000.	Greater (+) or less (—) than rate for all occupied males.	Ratio to rate for all occupied males.
15 to 19 years	0.54	0.69	+0.15	128
20 to 24 years	1.55	1.65	+ .10	106
25 to 34 years	2.03	2.18	+ .15	107
35 to 44 years	2.74	3.79	+1.05	138
45 to 54 years	3.04	3.83	+ .79	126
55 to 64 years	2.16	2.71	+ .55	125
65 years or over	1.11	1.86	+ .75	168

The recorded industrial insurance mortality statistics of cabinetmakers include 817 deaths from all causes. Of this number 162, or 19.8 per cent, were from consumption. In the mortality from respiratory diseases other than consumption there were 75 deaths from pneumonia, 14 from asthma, 14 from bronchitis, and 17 from other less frequent respiratory diseases. Of the total mortality 34.5 per cent was from diseases of the lungs and air passages. The mortality from consumption was excessive at all ages, but most so at 25 to 34, when out of every 100 deaths from all causes 55.7 were from consumption against a normal expected proportion of 31.3. The analysis of the mortality from consumption in detail is presented in the following table:

PROPORTIONATE MORTALITY FROM CONSUMPTION AMONG **CABINETMAKERS**, 1897 TO 1906, COMPARED WITH THAT OF ALL MALES IN THE REGISTRATION AREA OF THE UNITED STATES, 1900 TO 1906, BY AGE GROUPS.

[Figures for cabinetmakers from experience of an industrial insurance company; figures for males in the registration area computed from mortality statistics of the United States census.]

Age at death.	Deaths of cabinetmakers 1897 to 1906, due to—		Per cent of deaths due to consumption among—	
	All causes.	Consumption.	Cabinetmakers.	Males in registration area, 1900 to 1906.
15 to 24 years	39	14	35.9	27.8
25 to 34 years	61	34	55.7	31.3
35 to 44 years	82	40	48.8	23.6
45 to 54 years	136	31	22.8	15.0
55 to 64 years	197	29	14.7	8.1
65 years or over	302	14	4.6	2.7
Total	817	162	19.8	14.0

The observations and statistical data regarding the mortality of cabinetmakers confirm the conclusion that the degree of consumption frequency in this employment is decidedly excessive, and without question directly connected with the health-injurious circumstances of the trade. The excess in the degree of consumption frequency is most marked at ages 35 or over, which would make it probable that the type of the disease as met with in this employment assumes, in many cases, the fibroid form, or that of a distinct occupation disease.

WOOD TURNERS AND CARVERS.

Wood turning and carving are industries in which the conditions affecting health and life are much the same as in cabinetmaking and other woodworking industries. The amount of wood dust inhaled is probably larger, but no very conclusive information is available, with the exception of the health-injurious effects of working on so-called African boxwood, or satinwood, much of which is used for shuttle making. The effects of the dust, however, are probably not as serious to the lungs as to the system generally, and the most im-

portant effect of the dust of African boxwood is paralysis of the nerves. The whole subject was carefully considered before the commission on industrial diseases, and rules have been issued prohibiting the use of this wood, except under certain specified restrictions. The symptoms, as defined by Oliver, are similar to those occurring among cabinetmakers and joiners, who saw, chip, and otherwise manipulate the sequoia wood of our Pacific coast. It is stated that they resemble those exhibited by persons who are suffering from a bad cold in the head and chest, including irritation in the throat and bronchial tubes, accompanied by cough, labored breathing, and quickened pulse. The symptoms usually last only for a day or two and are usually seen only among men who are working with the wood for the first time. A tolerance seems to be established in regard to it, except in the case of men who are liable otherwise to bronchitis and asthma.

Oliver enlarges upon the subject and, after pointing out that certain kinds of wood have a bad reputation among joiners and that some sawdusts are more irritating than others, probably from the large amount of inorganic matter which they contain, he refers to conditions in Lancashire, where "the dust given off during the manufacture of shuttles for weaving purposes is a cause of malaise to the workmen employed. Many of them suffer from headache, coryza, excessive secretion of tears, and attacks of asthma." "The men who suffered presented a pale and jaundiced appearance; their breath had a peculiar camphor-like odor. Several of them had attacks of difficulty of breathing and of precordial pain accompanied by cold sweating. There was also marked slowing of the heart's action."

The health-injurious effects of wood working in hard woods, such as ebony and rosewood, have been recognized by different authorities on occupation diseases, and according to Arlidge of all woods rosewood produces the most obnoxious dust, emphasizing the fact that physical conformation and density of dust particles are not the sole factors governing the health-injurious effects on the human system.

The most recent English mortality statistics of wood turners and coopers are for the three years ending with 1902, referred to in the Supplement to the Sixty-fifth Annual Report of the Registrar-General in part as follows:

At every group of ages except 15 to 20 years, the death rate exceeds the standard for all occupied and retired males, the excess being greatest in middle life. In the main working period the comparative mortality figure is 1,181, or 18 per cent above the standard. From all the principal causes, except accident, the mortality exceeds the average. Wood turners and coopers are specially liable to phthisis, as well as to diseases of the respiratory system and to Bright's disease.

The recent English statistics of wood turners are quite conclusive of the unfavorable effects of this industry on health. In the table

which follows a comparison is made of the mortality from all causes among men in this group with that of occupied males generally, and the result is decidedly suggestive of conditions in the trade more or less unfavorable to life and health. The excess in the general death rate of wood turners is met with at all ages, but is most pronounced at ages 45 or over.

MORTALITY FROM ALL CAUSES AMONG **WOOD TURNERS,** COMPARED WITH THAT OF ALL OCCUPIED MALES IN ENGLAND AND WALES, 1900 TO 1902, BY AGE GROUPS.

[From Part II, Supplement to the Sixty-fifth Annual Report of the Registrar-General of Births, Deaths, and Marriages in England and Wales.]

Age at death.	Death rate per 1,000 for all occupied males.	Death rate of wood turners.		
		Rate per 1,000.	Greater (+) or less (−) than rate for all occupied males.	Ratio to rate for all occupied males.
15 to 19 years	2.44	1.94	−0.50	80
20 to 24 years	4.41	4.46	+ .05	101
25 to 34 years	6.01	6.23	+ .22	104
35 to 44 years	10.22	11.69	+1.47	114
45 to 54 years	17.73	24.98	+7.25	141
55 to 64 years	31.01	34.70	+3.69	112
65 years or over	88.39	92.82	+4.43	105

The preceding table is self-explanatory and requires no further comment. A more extended comparison, however, is made in the next table, in which the mortality of wood turners from consumption is compared with the normal mortality of occupied males from this disease, by divisional periods of life. The comparison shows that the mortality from consumption was excessive at all ages, but decidedly so at ages 35 to 54, when the excess was 1.05 per 1,000 at ages 35 to 44 and 2.48 per 1,000 at 45 to 54.

MORTALITY FROM CONSUMPTION AMONG **WOOD TURNERS,** COMPARED WITH THAT OF ALL OCCUPIED MALES IN ENGLAND AND WALES, 1900 TO 1902, BY AGE GROUPS.

[From Part II, Supplement to the Sixty-fifth Annual Report of the Registrar-General of Births, Deaths, and Marriages in England and Wales.]

Age at death.	Mortality from consumption.			
	Death rate per 1,000 for all occupied males.	Death rate for wood turners.		
		Rate per 1,000.	Greater (+) or less (−) than rate for all occupied males.	Ratio to rate for all occupied males.
15 to 19 years	0.54	0.63	+0.09	117
20 to 24 years	1.55	1.54	− .01	99
25 to 34 years	2.03	2.89	+ .86	142
35 to 44 years	2.74	3.79	+1.05	138
45 to 54 years	3.04	5.52	+2.48	182
55 to 64 years	2.16	2.96	+ .80	137
65 years or over	1.11	1.36	+ .25	123

The recorded industrial insurance mortality experience of wood turners includes 127 deaths from all causes, of which 25, or 19.7 per cent, were from consumption. Of the mortality of wood turners from other respiratory diseases, 3 were from asthma, 2 from bronchitis, 11 from pneumonia, and 5 from less frequent diseases of this class. If the deaths from consumption and from other respiratory diseases are combined, 36.2 per cent of the mortality of wood turners was from diseases of the lungs and air passages. The number of deaths of wood turners included in this analysis is not quite sufficient for a final conclusion, but is decidedly suggestive of health-injurious circumstances destructive of life and health at an early period of life. The excess in the consumption mortality is more clearly brought out in the tabular presentation of the proportionate mortality from this disease by divisional periods of life. The comparison shows that the consumption mortality was decidedly excessive at all ages under 65, but most so at 15 to 34, when the proportionate mortality was 70 per cent at ages 15 to 24, and 62.5 per cent at 25 to 34.

PROPORTIONATE MORTALITY FROM CONSUMPTION AMONG **WOOD TURNERS**, 1897 TO 1906, COMPARED WITH THAT OF ALL MALES IN THE REGISTRATION AREA OF THE UNITED STATES, 1900 TO 1906, BY AGE GROUPS.

[Figures for cabinetmakers from experience of an industrial insurance company; figures for males in the registration area computed from mortality statistics of the United States census.]

Age at death.	Deaths of wood turners, 1897 to 1906, due to—		Per cent of deaths due to consumption among—	
	All causes.	Consumption.	Wood turners.	Males in registration area, 1900 to 1906.
15 to 24 years	10	7	70.0	27.8
25 to 34 years	8	5	62.5	31.3
35 to 44 years	17	3	17.6	23.6
45 to 54 years	24	4	16.7	15.0
55 to 64 years	33	5	15.2	8.1
65 years or over	35	1	2.9	2.7
Total	127	25	19.7	14.8

The recorded industrial insurance mortality experience of wood carvers may be separately considered, and the statistics available include 123 deaths from all causes. Of this number, 27, or 22.0 per cent, were from consumption, and 16, or 13.0 per cent, from respiratory diseases other than consumption. Of the mortality from other respiratory diseases, 9 deaths were from pneumonia, 2 from asthma, 2 from bronchitis, and 3 from less frequent respiratory diseases. If the deaths from consumption and from other respiratory diseases are combined, 35 per cent of the total mortality of wood carvers is shown to have been from diseases of the lungs and air passages.

The following table gives the details of the comparative mortality of wood carvers from consumption in the recorded industrial mortality experience:

PROPORTIONATE MORTALITY FROM CONSUMPTION AMONG **WOOD CARVERS**, 1897 TO 1906, COMPARED WITH THAT OF ALL MALES IN THE REGISTRATION AREA OF THE UNITED STATES, 1900 TO 1906, BY AGE GROUPS.

[Figures for wood carvers from experience of an industrial insurance company; figures for males in the registration area computed from mortality statistics of the United States census.]

Age at death.	Deaths of wood carvers, 1897 to 1906, due to—		Per cent of deaths due to consumption among—	
	All causes.	Consumption.	Wood carvers.	Males in registration area, 1900 to 1906.
15 to 24 years	11	3	27.3	27.8
25 to 34 years	20	9	45.0	31.3
35 to 44 years	23	9	39.1	23.6
45 to 54 years	31	5	16.1	15.0
55 to 64 years	21	1	4.8	8.1
65 years or over	17	.....	.....	2.7
Total	123	27	22.0	14.8

The statistics for wood carvers do not show as great an excess in the mortality from consumption over the normal expected as was true of wood turners, but the excess is considerable, especially at ages 25 to 34 and 35 to 44. At ages 25 to 34, out of every 100 deaths from all causes 45 were from consumption, against 31.3 expected; at ages 35 to 44 the proportion was 39.1 for wood carvers, against 23.6 expected.

The observations and statistical data regarding the mortality of wood turners and wood carvers confirm the conclusions that the degree of consumption frequency in this employment is decidedly excessive and without question directly connected with the health-injurious circumstances of the trade. The excess in the degree of consumption frequency is most marked at advanced ages, which would make it probable that the type of the disease assumes in many cases the fibroid form or that of a distinct occupation disease.

SUMMARY OF CONCLUSIONS REGARDING OCCUPATIONS WITH EXPOSURE TO VEGETABLE FIBER DUST.

The occupations involving exposure to vegetable fiber dust have been considered in more or less detail. In this group, as in those exposing to metallic and mineral dusts, it has not been possible in all cases to base conclusions upon identical data, but the returns from the various available sources are sufficiently complete to be of considerable value. The census returns of 1900 give the age distribution of cotton-mill operatives, hosiery and knitting-mill operatives, paper and pulp mill

workers, and cabinetmakers, the aggregate number of such persons being 184,245. This number is exclusive of males under 15 and of males of unknown ages. The statistics show that only 4,342, or 2.4 per cent, had attained to an age of 65 or over, against a normal expected proportion of 4.7. This fact is quite suggestive of conditions unfavorable to health and life in occupations exposing to vegetable fiber dust. The details of the age distribution are given in the following table, by divisional periods of life, together with the corresponding percentage distribution of all occupied males, the data for both groups being derived from the census of 1900.

NUMBER AND PER CENT OF MALES IN EACH AGE GROUP IN **OCCUPATIONS EXPOSED TO VEGETABLE FIBER DUST,** COMPARED WITH NUMBER AND PER CENT IN ALL OCCUPATIONS IN THE UNITED STATES, 1900.

[From report of the Bureau of the Census on Occupations, 1900.]

Age.	Males in occupations exposed to vegetable fiber dust.		All occupied males.	
	Number.	Per cent.	Number.	Per cent.
15 to 24 years	73,209	39.7	5,933,720	26.0
25 to 34 years	47,213	25.6	5,993,847	26.3
35 to 44 years	31,584	17.1	4,704,682	20.6
45 to 54 years	19,115	10.4	3,250,259	14.3
55 to 64 years	8,782	4.8	1,856,181	8.1
65 years or over	4,342	2.4	1,063,856	4.7
Total	184,245	100.0	22,802,545	100.0

According to this analysis, the proportion of persons aged 15 to 34 was 65.3, or nearly two-thirds of the total, against 52.3 expected. At ages 45 or over, the proportion was 17.6 for the group under consideration, against 27.1 for occupied males generally. This favorable age distribution is due to the fact that in the textile industries a considerable proportion of the employees are comparatively young persons, the work being such that no great amount of muscular effort is required.

It is, unfortunately, not possible to present a combined summary of the United States census vital statistics of persons employed in occupations included in this group, since the vital statistics of the census deal only with cabinetmakers and upholsterers. A comparison of the rates for cabinetmakers and upholsterers with the mortality rates of occupied males generally indicates an excessive mortality among cabinetmakers at ages 25 to 44 and at ages 65 or over. The death rate from consumption for cabinetmakers and upholsterers was 3.59, against 2.37 expected, and the death rate from other respiratory diseases was 2.54, against 1.97 expected. The details of the mortality by ages are given in the following table, together with the corresponding death rates for all occupied males, the data for both groups being derived from the census of 1900:

MORTALITY FROM ALL CAUSES AMONG **CABINETMAKERS AND UPHOLSTERERS** IN THE REGISTRATION STATES, COMPARED WITH THAT OF ALL OCCUPIED MALES IN THOSE STATES, 1900, BY AGE GROUPS.

[From report of the Bureau of the Census on Vital Statistics, 1900.]

Age.	Cabinetmakers and upholsterers.			All occupied males.		
	Number employed.	Number of deaths from all causes.	Rate per 1,000 from all causes.	Number employed.	Number of deaths from all causes.	Rate per 1,000 from all causes.
15 to 24 years	4,135	19	4.59	1,259,471	6,486	5.15
25 to 44 years	12,239	128	10.46	2,680,241	23,541	8.78
45 to 64 years	6,825	135	19.78	1,282,259	25,532	19.91
65 years or over	1,496	164	109.63	283,310	27,888	98.44
Total	24,695	446	[a] 18.06	5,505,281	83,447	[b] 15.16

[a] From consumption there were 89 deaths, or a rate of 3.59. From other diseases of the respiratory system there were 63 deaths, or a rate of 2.54.

[b] The rate of mortality from consumption was 2.37; from other diseases of the respiratory system, 1.97.

The occupation mortality statistics of Rhode Island are available for five specific occupations included in this group, and when combined returned 927 deaths from all causes, of which 253 were from consumption and 87 from respiratory diseases other than consumption. The corresponding percentages were 27.3 of deaths from consumption for persons employed in groups with exposure to vegetable fiber dust, against 17.8 for occupied males generally in the State of Rhode Island. The percentage of deaths from other respiratory diseases was 9.4 for the occupations in this group, against 12.5 expected.

The English vital statistics for this group of occupations include textile operatives generally—hosiery workers, lace workers, cordage workers, paper-mill employees, cabinetmakers, and wood turners. When the statistics for these occupations are combined, they exhibit rather high death rates at all ages over 45. The details in tabular form are set forth in the following table:

MORTALITY FROM ALL CAUSES, FROM CONSUMPTION AND FROM OTHER RESPIRATORY DISEASES IN **OCCUPATIONS EXPOSED TO VEGETABLE FIBER DUST,** COMPARED WITH THAT OF ALL OCCUPIED MALES IN ENGLAND AND WALES, 1900 TO 1902, BY AGE GROUPS.

[From Part II, Supplement to the Sixty-fifth Annual Report of the Registrar-General of Births, Deaths, and Marriages in England and Wales.]

Age at death.	Death rate per 1,000 due to all causes among—		Death rate per 1,000 due to consumption among—		Death rate per 1,000 due to other diseases of the respiratory system.	
	All occupied males.	Occupations exposed to vegetable fiber dust.	All occupied males.	Occupations exposed to vegetable fiber dust.	All occupied males.	Occupations exposed to vegetable fiber dust.
15 to 19 years	2.44	2.59	0.54	0.75	0.24	0.26
20 to 24 years	4.41	4.15	1.55	1.63	.48	.54
25 to 34 years	6.01	5.49	2.03	2.18	.77	.73
35 to 44 years	10.22	9.57	2.74	3.16	1.66	1.46
45 to 54 years	17.73	19.08	3.04	3.80	3.32	3.61
55 to 64 years	31.01	35.47	2.16	2.79	6.54	8.33
65 years or over	88.39	104.00	1.11	1.63	17.77	23.35

The table shows that the mortality from consumption among males with exposure to vegetable fiber dust was excessive at all ages, but particularly so at ages 25 or over. The mortality from respiratory diseases, other than consumption, was about normal at ages 15 to 44, somewhat excessive at ages 45 to 54, and considerably above the normal expected at ages 55 or over.

The industrial insurance mortality statistics are available for eight occupations included in this group, returning in the aggregate 2,460 deaths of males from all causes at ages 15 years or over. Of this number 610, or 24.8 per cent, were from consumption. The deaths from respiratory diseases other than consumption numbered 326, or 13.3 per cent. The expected consumption mortality, on the basis of the mortality of males in the registration area of the United States for the seven-year period 1900 to 1906, was 14.8 per cent, and from other respiratory diseases 11.7 per cent. When the mortality from consumption and from other respiratory diseases is combined, the proportionate percentage of deaths of males in occupations with exposure to vegetable fiber dust was 38.0, against 26.5 per cent expected.

The following table gives the summary statistics in detail for the eight occupations in this group for which the industrial insurance mortality experience has been sufficiently large to warrant their inclusion:

PROPORTIONATE MORTALITY FROM CONSUMPTION IN **OCCUPATIONS EXPOSED TO VEGETABLE FIBER DUST,** 1897 to 1906, COMPARED WITH THAT OF ALL MALES IN THE REGISTRATION AREA OF THE UNITED STATES, 1900 to 1906, BY AGE GROUPS.

[Figures for occupations exposed to vegetable fiber dust from experience of an industrial insurance company; figures for males in registration area computed from mortality statistics of the United States census.]

Age at death.	Deaths in occupations exposed to vegetable fiber dust, 1897 to 1906, due to—		Per cent of deaths due to consumption in—	
	All causes.	Consumption.	Occupations exposed to vegetable fiber dust.	Males in registration area, 1900 to 1906.
15 to 24 years	244	97	39.8	27.8
25 to 34 years	369	199	53.9	31.3
35 to 44 years	355	143	40.3	23.6
45 to 54 years	404	94	23.3	15.0
55 to 64 years	475	54	11.4	8.1
65 years or over	613	23	3.8	2.7
Total	2,460	[a] 610	[a] 24.8	[b] 14.8

[a] There were also 326 deaths from other diseases of the respiratory system, or 13.3 per cent of the deaths from all causes.

[b] The per cent of deaths from other diseases of the respiratory system in the registration area was 11.7.

It is evident from the foregoing observations and statistical data relating to a representative number of employments with exposure to vegetable fiber dust that the effects of such exposure are decidedly health injurious. The summary table shows that the mortality from consumption among employees in this group of occupations is very much higher at all ages than would normally be expected.

OCCUPATIONS WITH EXPOSURE TO ANIMAL AND MIXED FIBER DUST.

In the group of occupations exposing to a continuous and considerable inhalation of animal and mixed fiber dusts resulting from necessary industrial processes have been included for the present purpose the following representative employments: Furriers, hatters, silk manufacture, woolen and worsted manufacture, carpet and rug manufacture, shoddy manufacture, rag industry, upholsterers and hair-mattress makers. These occupations are all more or less subject to an excessive death rate from all causes, but in particular to a decided excess in the proportionate mortality from consumption, and in most cases also to a comparatively high degree of frequency in the occurrence of respiratory diseases. The details of labor conditions, as far as they could be conveniently included in the following summary of observations regarding particular trades, appear to fully confirm the opinion that the degree of excess in consumption frequency is intimately related and in almost exact proportion to the degree of exposure to continuous and considerable inhalation of animal and mixed fiber dusts.

FURRIERS AND TAXIDERMISTS.

Fur dressing and dyeing are preliminary manipulations of the fur material for a large variety of subsequent industrial processes, of which the most important is the manufacture of felt hats. While the census of manufactures of 1905 returns the number of wage-earners employed in the dressing of fur at only 1,105,[a] the total is much larger when persons are included who manipulate fur as a preliminary process in hat manufacture, where the most important operations are pulling, blowing, and forming. All of these are employments exposing considerably and continuously to the inhalation of fine fur dust. The material used in felt hat manufacture is almost exclusively the fur of Belgian hares, which is imported for this purpose in enormous quantities. The preliminary process of fur pulling as carried on in Belgium and England is described in considerable detail by Rose E. Squire, one of His Majesty's inspectors of factories, whose observations and conclusions are of exceptional interest and value. Most of the fur pulling in Belgium is done by women, who

[a] Census of Manufactures, 1905, Part I, p. 232.

work under very trying conditions, and the haze of floating hair, the sickly, disgusting odor of uncleaned skins, and other unfavorable circumstances, attract to this employment only the lowest class of labor. According to Miss Squire, "Fur pullers and openers belong to the poorest class of women. The dirty and repulsive nature of the work, and the low scale of wages, attract none but those who, for one reason or another, can get no other employment." Fortunately, as this observer points out, "Machines are taking the place of hand pulling to a certain extent, but the chief part of the work is done in Belgium, where men do the pulling for a low wage. The manufacturer here finds it cheaper to pay the carriage of British rabbit skins to Belgium and back than to have them pulled in England. Fur pullers are, as a class, irregular workers, and, being paid by the piece, the employer has no hold upon them." While the circumstances of labor in fur pulling and kindred employments are apparently very objectionable and in all probability injurious to health, this conclusion has not been established by such investigations as have been made by Miss Squire and others, and in fact the former observes that "when the workers in any industry are drawn only from that class whose standard of life is the very lowest, when insufficient food and clothing and all the other sad accompaniments of deep poverty have made their mark upon them, it is almost impossible to point to any one physical condition as a result of their occupation. Hoarseness, cough, and a bronchitic condition are common among fur pullers; such are also observed in the old and middle-aged women of the same class who are not fur pullers. One would certainly expect to find evidence among them of suffering caused by inhaling the down present in the air of the workrooms; but, except for occasional complaints that "it stuffs up the chest," most of the workers consider fur pulling a healthy occupation. It may be that the fur being so fine and light is not inhaled; the danger is probably more to be found in swallowing it, and the symptoms of ill health arising from this are, from their nature, not easily discoverable, and must be related by the sufferer; but the poor fur pullers look with suspicion on any inquiry touching their health, fearing that they may be deprived of their work, which, although they say it is not worth the doing, is all they have." ([a])

Aside, however, from the question whether the industry is really injurious to health or not, the sanitary conditions can be materially modified to improve the comfort, and with practical certainty the health of the employees, for, according to Miss Squire, "Much more than has yet been attempted might be done to improve, by specially applied ventilation, the condition of fur-pulling rooms in factories and workshops. The drawing away of the pulled hair from the

[a] See article on "Rabbit down," by Miss Squire, in Oliver's Dangerous Trades, p. 724.

worker in a downward direction by means of a properly constructed flue under the troughs and an extracting fan would seem to be practicable, and the down could be collected outside in a receptacle for the purpose."

The dressing and dyeing of aquatic furs has been described at length in a bulletin of the United States Fish Commission, in which the various processes are illustrated, with special reference to American conditions. It is evident that in most of the processes the risk of dust inhalation is a very considerable one, chiefly, of course, of fine particles of hair, wood, fur (properly so called), and animal down, which is usually a waste product. There is, in addition, a not inconsiderable risk of exposure to the inhalation of other health-injurious kinds of dust, of which arsenic is the most important metallic substance, combining poisonous qualities. From this descriptive account the following is extracted, as emphasizing the more important circumstances which give rise to the production of health-injurious dust and which, no doubt, can be materially modified by improved methods of dust removal at the point of origin:

"If the overhairs are to be removed, that process is next in order, except in the dressing of muskrat skins, when it is usually postponed until after the dressing. In preparing for plucking, the hair side is dried and warmed by artificial heat, the membrane being kept moist in the meantime. Each skin is placed flesh side down on a flat, hardwood beam, similar to that used in breaking except that it is covered with thick, elastic leather. Chalk is first sprinkled over the hair, and then, using a knife similar to that employed in breaking, a workman rubs or works most of the overhairs out of the membrane. Those not removed in this manner are subsequently plucked out with a dull knife of soft metal. With this knife in his right hand and his thumb protected with a rubber cot about 4 inches in length, the picker grasps the hairs between the edge of the knife and his protected thumb and with a quick, jerking motion pulls them out, going over the entire pelt in this manner. The fur seal is quite difficult to unhair, and the process is more complicated."

The process of fur manufacture in felt-hat making is, for the present purpose, the most important one. The number of men employed as fur blowers and cutters in the felt-hat industry is not known with accuracy, but it forms an important branch of the industry. The processes, in their relation to health-injurious circumstances, have been described in some detail in a special report of the Massachusetts state board of health on dangerous occupations, from which the following extract is made:

In the manufacture of derby and felt hats the essential material is fur, and that used for the best product is from cony and allied species. This comes to the factory clipped from the skin and treated

with cyanide of mercury. The different kinds of fur are mixed together in large covered machines, in which the coarse hair is separated from the soft, downy fur, which latter is taken to the felt machine. This consists of a revolving copper cone, perforated with numerous small holes, through which the air is drawn by suction apparatus. The cone is inclosed in a barrel-like covering, open at the top, which has a door in the side for the removal of the felt as made. The fine hairs are blown into the upper part of the inclosure, and they are attracted toward the perforated cone by the air currents going thereto. They are then deposited in a thin layer on the outside of the cone, and when the deposit has gone on to a sufficient extent a cloth wrung out in hot water is applied, and the cone and its covering are removed and plunged into hot water for a short time, the heat and moisture causing the individual hairs to become more intimately matted; then the conical layer is pulled off and sent to the shrinking room.

The most recent English mortality statistics of furriers are for the three years ending with 1902, referred to in the Supplement to the Sixty-fifth Annual Report of the Registrar-General in part as follows:

The numbers comprised in this occupation are too limited to warrant more than general statements concerning them. Except at the age group 20 to 25 years, the death rates are considerably above the standard for all occupied and retired males, and at every age group their mortality very considerably exceeds that of tanners, being more than double as great at some stages of life. In the main working period their comparative mortality figure from all causes is 1,332, or 33 per cent above the standard, and no less than 72 per cent above the corresponding figure for tanners. The mortality from accident and from suicide is less than the standard for all occupied and retired males, and is also less than that for tanners, but from all other causes furriers suffer excessively, the mortality from cancer being three times as great, and that from influenza and phthisis, as well as from nervous and circulatory diseases, being about twice as great as that for tanners.[a]

The recent English statistics for furriers are quite conclusive of the more or less unfavorable effect of this industry on health. In the table which follows a comparison is made of the mortality from all causes among men in this group with that of occupied males generally, and the result is decidedly suggestive of conditions in this trade more or less unfavorable to life and health. The excess in the general death rate of furriers is met with at all ages. The excess in the death rate of furriers at ages 25 to 54 is between 2.29 and 2.69 per 1,000, increasing suddenly to astonishing proportions at ages 55 or over. While the excess at the age period 55 to 64, or 20.27 per 1,000, may be in part the result of comparatively small numbers, the comparison is, nevertheless, decidedly suggestive.

[a] Part II, Supplement to the Sixty-fifth Annual Report of the Registrar-General of Births, Deaths, and Marriages in England and Wales, p. lxv.

MORTALITY FROM ALL CAUSES AMONG **FURRIERS**, COMPARED WITH THAT OF ALL OCCUPIED MALES IN ENGLAND AND WALES, 1900 TO 1902, BY AGE GROUPS.

[From Part II, Supplement to the Sixty-fifth Annual Report of the Registrar-General of Births, Deaths, and Marriages in England and Wales.]

Age at death.	Death rate per 1,000 for all occupied males.	Death rate for furriers.		
		Rate per 1,000.	Greater (+) or less (−) than rate for all occupied males.	Ratio to rate for all occupied males.
15 to 19 years	2.44	3.72	+ 1.28	152
20 to 24 years	4.41	4.42	+ .01	100
25 to 34 years	6.01	8.52	+ 2.51	142
35 to 44 years	10.22	12.91	+ 2.69	126
45 to 54 years	17.73	20.02	+ 2.29	113
55 to 64 years	31.01	51.28	+20.27	165
65 years or over	88.39	107.84	+19.45	122

The preceding table is self-explanatory and requires no further comment. A more extended comparison, however, is made in the next table, in which the mortality of furriers from consumption is compared with the normal mortality of occupied males from this disease by divisional periods of life. The comparison shows that the mortality from consumption was excessive at all ages 20 or over, the excess being most marked at ages 35 to 44 and at ages 55 or over.

MORTALITY FROM CONSUMPTION AMONG **FURRIERS**, COMPARED WITH THAT OF ALL OCCUPIED MALES IN ENGLAND AND WALES, 1900 TO 1902, BY AGE GROUPS.

[From Part II, Supplement to the Sixty-fifth Annual Report of the Registrar-General of Births, Deaths, and Marriages in England and Wales.]

Age at death.	Mortality from consumption.			
	Death rate per 1,000 for all occupied males.	Death rate for furriers.		
		Rate per 1,000.	Greater (+) or less (−) than rate for all occupied males.	Ratio to rate for all occupied males.
15 to 19 years	0.54	.....	.....	.....
20 to 24 years	1.55	1.77	+ .22	114
25 to 34 years	2.03	3.46	+1.43	170
35 to 44 years	2.74	4.74	+2.00	173
45 to 54 years	3.04	3.86	+ .82	127
55 to 64 years	2.16	7.33	+5.17	339
65 years or over	1.11	5.88	+4.77	530

The recorded industrial insurance mortality statistics of furriers and taxidermists include 105 deaths from all causes, of which 34, or 32.4 per cent, were from consumption. Of the mortality of furriers from respiratory diseases other than consumption, 9 were from pneumonia, 5 from bronchitis, and 3 from less frequent respiratory diseases. If the deaths from consumption and from other respiratory diseases

are combined, 48.6 per cent of the mortality of furriers was from diseases of the lungs and air passages. The excess in the consumption mortality of furriers is still more clearly brought out in the tabular presentation of the proportionate mortality from this disease by divisional periods of life. While the consumption mortality was excessive at all ages, the excess was most pronounced at 35 to 44, when out of every 100 deaths from all causes 63.3 were from consumption, against a normal expected proportion of 23.6. The numbers are too small for other periods of life to warrant entirely safe conclusions. The analysis of the consumption mortality of furriers in detail is set forth in the table below:

PROPORTIONATE MORTALITY FROM CONSUMPTION AMONG **FURRIERS AND TAXIDERMISTS,** 1897, TO 1906, COMPARED WITH THAT OF ALL MALES IN THE REGISTRATION AREA OF THE UNITED STATES, 1900 TO 1906, BY AGE GROUPS.

[Figures for furriers and taxidermists from experience of an industrial insurance company; figures for males in the registration area computed from mortality statistics of the United States census.]

Age at death.	Deaths of furriers and taxidermists, 1897 to 1906, due to—		Per cent of deaths due to consumption among—	
	All causes.	Consumption.	Furriers and taxidermists.	Males in registration area, 1900 to 1906.
15 to 24 years	3	1	33.3	27.8
25 to 34 years	18	7	38.9	31.3
35 to 44 years	30	19	63.3	23.6
45 to 54 years	13	4	30.8	15.0
55 to 64 years	24	2	8.3	8.1
65 years or over	17	1	5.9	2.7
Total	105	34	32.4	14.8

The preceding observations and statistical data regarding the mortality of furriers confirm the conclusion that the degree of consumption frequency in this employment is decidedly excessive and without question directly connected with the health-injurious circumstances of the trade. The excess in the degree of consumption frequency in England and Wales is most marked at advanced years, which would make it probable that the type of the disease assumes in many cases the fibroid form, or that of a distinct occupation disease.

HATTERS.

All who have written on the diseases of occupation have included felt hat manufacture among the trades specifically injurious to health and life. The conditions which give rise to a high death rate and the degree of disease frequency above the normal are primarily due to the

continuous and considerable exposure to the inhalation of irritating dust, which is produced during nearly every important process of hat manufacture except the sizing, where steam and vapor, combined with high temperature, increase considerably the liability of the workmen to respiratory diseases. Mercurial poisoning is another serious risk of the industry, but limited to finishers and a few other departments, and, fortunately, less common at the present time than in former years. The felt hat making industry is concentrated in a few States, chiefly New Jersey, New York, and Connecticut. The industry, according to the census of manufactures of 1905, gave employment to 22,047 wage-earners, and of this number 15,432 were males 16 years of age or over.(a) In addition, however, the manufacture of wool hats gave employment to 1,503 wage-earners, and the manufacture of hat and cap materials to 2,414.

The concentration of the industry in New Jersey early attracted the attention of qualified medical observers, and as far back as 1860 Dr. J. A. Freeman, of Orange, prepared an address on Mercurial Diseases among Hatters for the New Jersey state medical society. In 1878 Dr. L. Dennis, of Newark, prepared a report on Hatting as Affecting the Health of Operatives, at the request of the state board of health, which was published that year in the annual report of the board. In 1886, by request of the same authority, Dr. J. W. Stickler, of Orange, prepared an extended account of the Hygiene of Hat Manufacture and the Diseases of Hatters, including the personal examination of a large number of workmen for evidences of physical impairment in consequence of the industry. The medical investigations were amplified during the years 1889 to 1895 by an elaborate inquiry through the state bureau of labor statistics into the effects of the occupation on the trade life of persons employed in the industry, as part of a general investigation, including many other dangerous and unhealthy employments. The various investigations all confirm the generally accepted view of qualified authorities, that the manufacture of felt hats is attended with more or less health-injurious circumstances, but that some departments of the industry are decidedly more exposed to this risk than others. While the investigations have never been entirely conclusive, in the absence of thoroughly trustworthy statistics of mortality for the more important employments, felt cutters, hat makers, and sizers are apparently the most liable to respiratory and pulmonary diseases and subject to a death rate above the average for persons generally employed in felt hat manufacture. Other employments decidedly injurious to health are pouncing, singeing, steaming, drying, hardening, and

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[a] Census of Manufactures, 1905, Part I, p. 252.

mixing, in all of which considerable dust or other health-injurious circumstances increase the liability to respiratory and pulmonary diseases. Finishers, flangers, and curlers are important employments apparently less liable to these diseases, but the degree of difference is, in all probability, not great, since these occupations are often carried on under about the same conditions as other employments previously enumerated, the three occupations being frequently conducted in the same or in adjoining rooms. The improvements which have been introduced into the industry, including the inclosure of dust-producing machinery and the more effectual control of the dust generated during pouncing and finishing at the point of origin, has, no doubt, resulted in a marked improvement during very recent years. Many of the hat factories have been rebuilt and the conditions in the modern factories are decidedly better than in those constructed in former years.

The general vital statistics regarding hatters are very limited but fairly conclusive. According to the vital statistics of 1890 there were enumerated 14,222 hat and cap makers in the registration States of the United States, and of this number 356, or 2.5 per cent, had attained to the age of 65 years or over. The number of deaths from all causes in this group was 277, and of this number 94, or 33.9 per cent, were from consumption. The mortality from all causes for hatters was considerably higher in each age group than the corresponding average for this class of occupations, and at ages 25 to 44, inclusive, the death rate of hat and cap makers was 19.27 per 1,000, or more than twice the average rate in occupations of this class, which was returned as 9.18. The specific death rate from consumption was 6.61 per 1,000, and from respiratory diseases other than consumption, 2.95 per 1,000. The rates were high for all diseases except heart disease and suicide. The death rate from consumption was more than twice the average rate and extremely high in the cities of the registration States only, for which it was returned as 7.8 per 1,000.[a]

The vital statistics of the census of 1900 included the mortality occurring among 12,680 males of known ages 15 or over enumerated as being employed in this group of occupations. The number of deaths from all causes in this group was 228, and the corresponding death rate 18 per 1,000. The death rates per 1,000 of population, by divisional periods of life, were, at ages of 15 to 24, 5.40; at ages 25 to 44, 13.10; at ages 45 to 64 the rate was 32.96; and at ages 65 or over it was 173.8. The death rates of hat and cap makers were generally above the average for the manufacturing and mechanical industries class, being highest from consumption, heart disease,

[a] Vital Statistics, Eleventh Census, Part I, p. 138.

and pneumonia.(a) For reasons not stated in the census report, the details regarding the mortality in this occupation were less fully reported in connection with the census of 1900 than in connection with that of 1890.

For some years the vital statistics of the United Hatters of North America have been published in semiannual reports, and combining their returns for the period June 1, 1898, to November 30, 1901, there occurred 412 deaths from all causes, and of this number 133, or 32.3 per cent, were from consumption. The number of deaths from respiratory diseases other than consumption was 52, or 12.6 per cent. Combining the deaths from consumption and from other respiratory diseases, there were 185 deaths from diseases of the lungs and air passages, or 44.9 per cent of the mortality from all causes.

The most recent English mortality statistics of hatters are for the three years ending with 1902, referred to in the Supplement to the Sixty-fifth Annual Report of the Registrar-General, in part, as follows:

The mortality in this occupation shows an excess at every stage of life, the excess being most marked at ages 20 to 25 and 65 and upward. In the main working period the comparative mortality figure is 1,137, or above the standard for all occupied and retired males by 13 per cent. Hatters appear to be specially liable to phthisis, the mortality from that disease exceeding the normal by 50 per cent, and also to other diseases of the respiratory system and to Bright's disease, the mortality from which is above the average by 40 per cent. Suicide is also frequent. On the other hand, the mortality from influenza, nervous diseases, and accident is below the average.(b)

The recent English mortality statistics of hatters are entirely conclusive of the unfavorable effects of this industry on health. In the table which follows a comparison is made of the mortality from all causes among men in this group with that of occupied males generally, and the result is suggestive of conditions in this trade more or less unfavorable to life and health. The excess in the general death rate of hatters is met with at all ages, but the relative and actual excess is most pronounced at ages 45 or over. In this respect the mortality of hatters quite closely resembles the corresponding mortality of furriers and taxidermists.

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a Vital Statistics, Twelfth Census, Part I, p. cclxxxiv.

b Part II, Supplement to the Sixty-fifth Annual Report of the Registrar-General of Births, Deaths, and Marriages in England and Wales, p. lxii.

MORTALITY FROM ALL CAUSES AMONG **HATTERS**, COMPARED WITH THAT OF ALL OCCUPIED MALES IN ENGLAND AND WALES, 1900 TO 1902, BY AGE GROUPS.

[From Part II, Supplement to the Sixty-fifth Annual Report of the Registrar-General of Births, Deaths, and Marriages in England and Wales.]

Age at death.	Death rate per 1,000 for all occupied males.	Death rate for hatters.		
		Rate per 1,000.	Greater (+) or less (−) than rate for all occupied males.	Ratio to rate for all occupied males.
15 to 19 years	2.44	2.90	+ 0.46	119
20 to 24 years	4.41	6.19	+ 1.78	140
25 to 34 years	6.01	6.70	+ .69	111
35 to 44 years	10.22	11.44	+ 1.22	112
45 to 54 years	17.73	19.82	+ 2.09	112
55 to 64 years	31.01	35.97	+ 4.96	116
65 years or over	88.39	103.42	+15.03	117

The preceding table is self-explanatory and requires no further comment. A more extended comparison is made in the next table, in which the mortality of hatters from consumption and other respiratory diseases is compared with the normal mortality of occupied males from these diseases, by divisional periods of life. The comparison shows that the mortality from consumption is excessive at all ages, but the excess is most marked at ages 20 to 54. The table further shows that the mortality of hatters from other respiratory diseases is above the average for occupied males generally at ages 45 or over, by from 1.60 to 6.10 per 1,000. The two tables derived from English sources fully confirm the previous conclusion that the mortality of hatters is excessive when proper comparison is made with the corresponding mortality of occupied males generally, and that this excess is largely because of the high degree of consumption frequency at ages 20 to 54. The table which follows requires no further comment and is otherwise self-explanatory:

MORTALITY FROM CONSUMPTION AND FROM OTHER DISEASES OF THE RESPIRATORY SYSTEM AMONG **HATTERS**, COMPARED WITH THAT OF ALL OCCUPIED MALES IN ENGLAND AND WALES, 1900 TO 1902, BY AGE GROUPS.

[From Part II, Supplement to the Sixty-fifth Annual Report of the Registrar-General of Births, Deaths, and Marriages in England and Wales.]

Age at death.	Mortality from consumption.				Mortality from other diseases of the respiratory system.			
	Death rate per 1,000 for all occupied males.	Death rate for hatters.			Death rate per 1,000 for all occupied males.	Death rate for hatters.		
		Rate per 1,000.	Greater (+) or less (−) than rate for all occupied males.	Ratio to rate for all occupied males.		Rate per 1,000.	Greater (+) or less (−) than rate for all occupied males.	Ratio to rate for all occupied males.
15 to 19 years	0.54	0.61	+0.07	113	0.24	.....	.....	.....
20 to 24 years	1.55	3.47	+1.92	224	.48	0.30	−0.18	63
25 to 34 years	2.03	3.70	+1.67	182	.77	.77	.....	100
35 to 44 years	2.74	4.11	+1.37	150	1.66	1.33	− .33	80
45 to 54 years	3.04	4.76	+1.72	157	3.32	4.92	+1.60	148
55 to 64 years	2.16	2.17	+ .01	100	6.54	10.85	+4.31	166
65 years or over	1.11	.....	.....	.....	17.77	23.87	+6.10	134

The recorded industrial insurance mortality statistics of hatters include 832 deaths from all causes, of which 278, or 33.4 per cent, were deaths from consumption. Of the mortality of hatters from respiratory diseases other than consumption, 71 were from pneumonia, 4 from asthma, 12 from bronchitis, and 10 from less frequent respiratory diseases. If the deaths from consumption and from other respiratory diseases are combined, 45.1 per cent of the mortality of hatters was from diseases of the lungs and air passages. The excess in the consumption mortality of hatters is still more clearly brought out in the tabular presentation of the proportionate mortality from this disease by divisional periods of life. While the consumption mortality was excessive at all ages, the excess was most pronounced at ages 25 to 34, when out of every 100 deaths from all causes 55.4 were from consumption, against a normal expected proportion of 31.3. Very few deaths from consumption occurred among hatters at ages 65 or over, but the proportionate mortality was exceptionally high at young ages, having been 53.8 per cent at ages 15 to 24. The analysis of the consumption mortality of hatters in detail is set forth in the following table:

PROPORTIONATE MORTALITY FROM CONSUMPTION AMONG **HATTERS,** 1897 TO 1906, COMPARED WITH THAT OF ALL MALES IN THE REGISTRATION AREA OF THE UNITED STATES, 1900 TO 1906, BY AGE GROUPS.

[Figures for hatters from experience of an industrial insurance company; figures for males in the registration area computed from mortality statistics of the United States census.]

Age at death.	Deaths of hatters, 1897 to 1906, due to—		Per cent of deaths due to consumption among—	
	All causes.	Consumption.	Hatters.	Males in registration area, 1900 to 1906.
15 to 24 years	78	42	53.8	27.8
25 to 34 years	175	97	55.4	31.3
35 to 44 years	185	84	45.4	23.6
45 to 54 years	127	34	26.7	15.0
55 to 64 years	135	20	14.8	8.1
65 years or over	132	1	.8	2.7
Total	832	278	33.4	14.8

The preceding observations and statistical data confirm the conclusion that hatters as a class are subject to an excessive mortality from consumption, but in particular at ages 15 to 64, and this excess, in view of the conditions of labor briefly described, is in a large measure the result of health-injurious circumstances connected with the employment.

SILK MANUFACTURE.

Silk manufacture in the United States is a highly diversified industry, giving employment in 1905 to some 79,601 wage-earners, in 624 manufacturing establishments. Of the number employed 27,037

were adult males, or 34 per cent.(a) A large number of women, and children under 16 years of age, are employed in this industry, which offers exceptional opportunities for light and fairly remunerative employment particularly adapted to women and children. While the number of persons employed in the industry has materially increased within recent years, the principal increase has been chiefly in the number of women wage-earners, or to be specific, from about 35,000 in 1900 to a little over 45,000 in 1905. The actual extent of the silk industry, however, is greater than indicated by these statistics, since the manufacture of silk hosiery and silk knit goods is included in the hosiery and knitting industries generally. By products, the industry divides itself into the manufacture of broad silks of many varieties, ribbons, velvets, plushes, tapestry and upholstery goods, machine twists, floss, etc. How far the conditions affecting health vary in the different branches of the industry has not yet been determined with the required accuracy to warrant entirely safe conclusions.

The most important processes in silk manufacture are winding, reeling, spinning, throwing or twisting, warping, weaving, picking, cleansing, and dyeing. On account of the very large variety of goods manufactured and the admixture, according to requirements, of the silk with other textile materials, chiefly cotton and wool, the degree of dust exposure in the different employments varies considerably, so much so that no definite rule can be laid down which would clearly differentiate the health-injurious processes from those which are comparatively innocuous. The hygiene of employment in silk mills was carefully considered by Arlidge, whose opinion was decidedly in favor of silk manufacture as compared with the corresponding conditions affecting health in the manufacture of cotton, linen, or wool. In his opinion the silk industry stands lowest in the list of textile manufactures as a dust-producing and a health-destroying occupation, and is, apart from the general insanitary features surrounding all textile operations, practically devoid of evils originating in the quality of the material and its manipulation, excepting in one department, and that is where waste silk is worked or manipulated for subsequent manufacturing purposes. The processes of winding, twisting, reeling, and spinning, in the opinion of Arlidge, are accompanied by little or no dust where the best silk is in use, and he regards all of these as harmless to health. Since these observations were made a matter of record, however, it is necessary to keep in mind that the admixture of other textile fibers in the manufacture of mixed goods has very considerably increased—so much so that nearly 10,000,000 pounds of yarn other than silk were used by silk mills, according to the census of manufactures of 1905.

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[a] Census of Manufactures, 1905, Part III, p. 161.

Regarding the manufacture of silk waste, Arlidge states that this material is derived either from mills where the best silk is employed, of which it represents, in a certain sense, the refuse; or else from a certain grade of cocoons received from abroad and differing widely in quality. Many of these are so mixed with dirt as to offer, to the uninstructed eye, no semblance of being silk at all, and it is these impure cocoons that give rise, in the preparatory stages of manufacture, to foul smells and dust. Arlidge refers to a report by Redgrave in 1872, to the effect that, "The dressing of waste silk is one of the most nauseous of occupations," which, however, may be rendered comparatively inoffensive and harmless by proper ventilating appliances.

The preparatory processes after the boiling of the cocoon are, according to Arlidge, conducted in what are called the dressing rooms, and it is almost exclusively in these rooms that dust is encountered While many carding machines are inclosed and only give rise to dust at intervals when opened for any purpose, there are horizontally acting machines not admitting of inclosure by their present construction, which do throw off fine dust traceable on surrounding objects and perceptible as a haze in the atmosphere around. In addition to the dressing process, so-called gassing is decidedly injurious to health, since the burned minute particles of silk float in the air, producing the smell of combustion of animal matter to a perceptible degree and likewise a dust visible as a thin haze. The temperature in these rooms is, as a rule, excessive, while the atmosphere is grossly polluted unless artificial ventilation is provided. These observations of Arlidge are in marked contrast to the earlier conclusions of Doctor Greenhow, who conducted an inquiry into the mortality of towns in which the silk industry was concentrated during the early sixties. The mortality from consumption in these towns at that time was extremely high, but during the intervening period vast improvements have taken place and the mortality from consumption has been reduced to the normal of English towns generally. No really qualified investigation, however, has been made into the actual conditions affecting the health of workers in silk mills at the present time, and even Arlidge is forced to the conclusion that—

A certain amount of asthmatic breathing and bronchitis is, after long employment, set up by the dust of the dressing department and by that of gassing. And judging from the experience of the Macclesfield Infirmary, a considerable number of silk workers break down as age advances with symptoms of fibroid phthisis. Unfortunately there appears to have been no medical research into the pathology of such cases, and no statistical record kept. Further, the high temperature existing in certain workrooms can not be without effect on health. Indeed, the aspect of many of the women, their anæmia and other signs, betray the ills attending their calling.

The very favorable conclusions of Arlidge are also in contrast to the conclusions of Dr. Pierre Givre, who in 1890 published a treatise on tuberculosis among silk workers, chiefly in the silk district of Lyon. According to these researches, among a very considerable number of deaths of silk workers during a long period of years, including both sexes, the mortality from tuberculosis had equaled 35.6 per cent of the mortality from all causes. On contrasting the male with the female workers, the latter exhibited a decidedly higher proportion, while at the same time the deaths occurred at an earlier age. Doctor Givre's opinion was particularly unfavorable to the employments of winders and carders, compared with other branches of the industry. Additional statistical evidence regarding the hygiene of silk manufacture is referred to by Arlidge, who obtained from Dr. Henry Fernie, of Macclesfield, the statistics of 922 persons engaged in the silk trade treated as out-patients at the infirmary. Among this number 25 per cent were cases of either tubercular or respiratory diseases.

For a really conclusive opinion more data are required than thus far have been brought together, with special reference to essential differences in methods of manufacture according to the kind of goods manufactured. As previously stated, the industry lends itself peculiarly to the employment of women and children, and an examination of the age distribution proves that there are comparatively few persons of advanced ages employed in silk manufacture. The age distribution of 49,422 silk workers, 15 years of age or over, with distinction of sex, was as follows:

NUMBER AND PER CENT OF MALE AND OF FEMALE **SILK WORKERS** IN EACH AGE GROUP, 1900.

[From report of the Bureau of the Census on Occupations, 1900.]

Age.	Male silk workers.		Female silk workers.	
	Number.	Per cent.	Number.	Per cent.
15 to 24 years	9,022	44.4	21,884	75.1
25 to 34 years	5,301	26.1	5,082	17.5
35 to 44 years	3,380	16.7	1,519	5.2
45 to 54 years	1,563	7.7	461	1.6
55 to 64 years	785	3.9	127	.4
65 years or over	250	1.2	48	.2
Total	20,301	100.0	29,121	100.0

The table emphasizes the concentration of employments in silk manufacture at the younger ages and the comparative infrequency of employment at ages over 45. Whether the comparatively small number of persons employed in old age is the result of heavy mortality following the early years of employment, or whether it is because of labor requirements more favorable to the employment of

young persons, can not be determined at the present time. The table, however, is decidedly suggestive and it probably has some connection with the higher mortality of silk workers than is normal to the general population, although a large number, no doubt, after suffering a temporary impairment, leave the industry for other employments, and they are thus lost sight of in the vital statistics of the trade.

While no conclusive investigation has been made to determine the health conditions in the different branches of the industry, it is probably quite safe to assume that employment in plush and velvet mills is a more dusty occupation than that in mills manufacturing sewing silk or the usual grade of ribbons and broad goods. In the plush mills, employment in the finishing rooms exposes to a considerable amount of dust. Also, in the shearing rooms there is considerable dust, which, however, is reduced by the required humidity of the atmosphere. In the brushing rooms there is considerable dust, and there is probably even more dust at the pegging and so-called tagging machines, which are difficult of exact description. Thus far no thorough investigation has been made, either in this country or abroad, which would warrant final conclusions as to whether the decidedly favorable opinion of Arlidge is warranted by present-day conditions, but as far as it is possible to judge the mortality of silk-mill workers and their liability to tubercular and respiratory diseases is somewhat below the average for persons employed in cotton and woolen mills. The most recent English mortality statistics of silk manufacture are for the three years ending with 1902, referred to in the Supplement to the Sixty-fifth Annual Report of the Registrar-General, in part, as follows:

The mortality of these workers is below the standard for occupied and retired males at all ages up to the fifty-fifth year, the defect being especially noticeable at the age group 25–35 years. Above the age of 55 years the rates exceed the standard. The comparative mortality figure in the main working period of life is 964, or 4 per cent below the average. These workers are liable to less than one-third of the standard mortality from accident, to one-half of that from influenza, and to two-thirds of that from respiratory diseases, and their mortality from alcoholism and liver disease, as well as from cancer, is also low. On the other hand, they show excessive mortality from phthisis, nervous diseases, Bright's disease, and suicide, especially from the two causes last mentioned.(a)

The recent English mortality statistics for silk workers are quite conclusive of the more or less unfavorable effects of this industry on health as regards the more advanced periods of life. In the table which follows a comparison is made of the mortality from all causes of men in this group with occupied males generally, and the comparison shows that the death rates of silk workers were below the av-

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a Part II, Supplement to the Sixty-fifth Annual Report of the Registrar-General of Births, Deaths, and Marriages in England and Wales, p. lxxxvii.

erage at ages 15 to 44, slightly above the average at ages 45 to 54, and decidedly so at 55 years or over, when the excess in the death rate was 5 per 1,000 at ages 55 to 64 and 19.16 at 65 or over.

MORTALITY FROM ALL CAUSES AMONG MALE **SILK WORKERS** COMPARED WITH THAT OF ALL OCCUPIED MALES IN ENGLAND AND WALES, 1900 TO 1902, BY AGE GROUPS.

[From Part II, Supplement of the Sixty-fifth Annual Report of the Registrar-General of Births, Deaths, and Marriages in England and Wales.]

Age at death.	Death rate per 1,000 for all occupied males.	Death rate for male silk workers.		
		Rate per 1,000.	Greater (+) or less (−) than rate for all occupied males.	Ratio to rate for all occupied males.
15 to 19 years	2.44	2.30	− 0.14	94
20 to 24 years	4.41	3.27	− 1.14	74
25 to 34 years	6.01	4.12	− 1.89	69
35 to 44 years	10.22	8.56	− 1.66	84
45 to 54 years	17.73	17.90	+ .17	101
55 to 64 years	31.01	36.01	+ 5.00	116
65 years or over	88.39	107.55	+19.16	122

The preceding table is self-explanatory and requires no further comment. A more extended comparison is made in the next table, in which the mortality of silk workers from consumption is compared with the normal mortality of occupied males from this disease, by divisional periods of life. The comparison shows that the mortality from consumption is excessive at ages 20 to 34, inclusive, and at ages 45 or over. The exceptions are of minor importance, but the comparison suggests a degree of consumption frequency materially above the average, or by from 0.27 to 1.53 per 1,000. The table which follows requires no further comment:

MORTALITY FROM CONSUMPTION AMONG MALE **SILK WORKERS** COMPARED WITH THAT OF ALL OCCUPIED MALES IN ENGLAND AND WALES, 1900 TO 1902, BY AGE GROUPS.

[From Part II, Supplement to the Sixty-fifth Annual Report of the Registrar-General of Births, Deaths, and Marriages in England and Wales.]

Age at death.	Mortality from consumption.			
	Death rate per 1,000 for all occupied males.	Death rate for male silk workers.		
		Rate per 1,000.	Greater (+) or less (−) than rate for all occupied males.	Ratio to rate for all occupied males.
15 to 19 years	0.54	0.23	−0.31	43
20 to 24 years	1.55	1.82	+ .27	117
25 to 34 years	2.03	2.40	+ .37	118
35 to 44 years	2.74	2.05	− .69	75
45 to 54 years	3.04	3.95	+ .91	130
55 to 64 years	2.16	3.69	+1.53	171
65 years or over	1.11	2.00	+ .89	180

The recorded industrial insurance mortality statistics of silk workers include 295 deaths from all causes, of which 106, or 35.9 per cent, were from consumption. Of the mortality of silk workers from respiratory diseases other than consumption 21 were from pneumonia, 5 from asthma and bronchitis, and 7 from less frequent respiratory diseases. If the deaths from consumption and from other respiratory diseases are combined, 47.1 per cent of the mortality of silk workers was from diseases of the lungs and air passages. The excess in the consumption mortality of silk workers is still more clearly brought out in the tabular presentation of the proportionate mortality from this disease by divisional periods of life. While the consumption mortality was excessive at all ages, the excess was most pronounced at ages 35 to 44, when out of every 100 deaths from all causes 60 were from consumption, against a normal expected proportion of 23.6. The analysis of the consumption mortality of silk-mill workers in detail is set forth in the following table:

PROPORTIONATE MORTALITY FROM CONSUMPTION AMONG **SILK WORKERS**, 1897 TO 1906, COMPARED WITH THAT OF ALL MALES IN THE REGISTRATION AREA OF THE UNITED STATES, 1900 TO 1906, BY AGE GROUPS.

[Figures for silk workers from experience of an industrial insurance company; figures for males in the registration area computed from mortality statistics of the United States census.]

Age at death.	Deaths of silk workers, 1897 to 1906, due to—		Per cent of deaths due to consumption among—	
	All causes.	Consumption.	Silk workers.	Males in registration area, 1900 to 1906.
15 to 24 years	82	28	34.1	27.8
25 to 34 years	61	32	52.5	31.3
35 to 44 years	55	33	60.0	23.6
45 to 54 years	31	7	22.6	15.0
55 to 64 years	37	4	10.8	8.1
65 years or over	29	2	6.9	2.7
Total	295	106	35.9	14.8

The preceding observations and statistical data confirm the conclusion that silk workers as a class are subject to an excessive mortality from consumption, but in particular at ages 15 to 44, and this excess, in view of the conditions of labor briefly described, is in a large measure the result of health-injurious circumstances connected with the employment.

WOOLEN AND WORSTED MANUFACTURE.

The manufacture of woolen and worsted goods has, during recent years, developed into an American industry of very considerable proportions, and in 1905 gave employment to 143,458 wage-earners. Of

this number 75,717 were males, 56,749 females, and 10,992 children and young persons under 16 years of age. While an exact division of the industry into woolen and worsted manufacture is somewhat difficult, in approximate numbers there were 72,747 employed in the manufacture of woolen goods, 69,251 in the manufacture of worsted goods, in addition to which there were enumerated 681 wool pullers and 779 wool scourers.(a) The importance of the woolen industry is gradually declining, while the manufacture of worsted goods is taking its place. Although the processes of manufacture are very much the same as in cotton textiles generally, the worsted industry is a very much more technical process, including some fifty well-defined subdivisions of labor. The most important of these are sorting, scouring, carding, combing, spinning, weaving, dyeing, and finishing. In nearly all of these processes the exposure to animal fiber dust is quite considerable, being somewhat greater in the manufacture of woolen than of worsted goods. The processes of scouring, dyeing, and fulling are comparatively free from dust, but steam, vapor, and dampness increase the disease liability of the workmen in these employments.

Wool sorting is quite a dusty employment, but the risk of so-called "wool-sorter's disease" is limited to the handling of certain grades of foreign wool, chiefly van-mohair, alpaca, East Indian cashmere, and camel's hair, all of which are imported from the Far East. Since these wools are usually imported by way of England they are there, under factory regulations, subjected to a disinfecting process, by which the risk of anthrax is reduced to a minimum. In no branch of the woolen industry is artificial ventilation and dust removal of greater importance than in wool and rag sorting, which, in common with the general risk of dust injury, has the additional risk of transmission of infectious diseases, chiefly anthrax and smallpox. An effective device for removing the dust in wool sorting has been described by Haldane in his lecture on the removal of dust and fumes of factories before the Royal Society of Arts.

The woolen and worsted industries are of such great complexity that only a few of the more important occupations can be considered at this time. Thackrah, in his comments upon the diseases peculiar to persons employed in the manufacture of woolen and worsted goods, observes:

Wool combers work in apartments which, from the fire employed to heat the combs, are kept at the temperature of about 80°. The fires are made of charcoal. From the evolution of carbonic-acid gas, when the windows are not sufficiently open, the men are occasionally affected with headache. In some of the manufactories an attempt

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[a] Census of Manufactures, 1905, Part III, p. 128.

has been made to heat the combs by means of steam, but the workmen complain that by this mode the rooms are made hotter and the combs colder; in other words that the increase of temperature is more diffused. A light dust arises from the wool, or rather perhaps from the soap retained by the wool after washing. It annoys the air tube and obliges some persons to leave the employ. The men, however, whom we found in the rooms appeared quite healthy, and we were informed that out of 100 individuals only 2 or 3 were absent from illness. * * * The heat of the apartments does not appear to shorten life. We have repeatedly seen at work men from 60 to 70 years of age.

The same authority says with reference to worsted spinners that—

Spinners of worsted, chiefly young persons, are exposed to considerable heat in rooms traversed by steam pipes and often deficient in ventilation. The thermometer, in November, we have found in the spinning rooms at 65° and 70°, and in the warping rooms, where steam pipes are not introduced, 58°, while in the open air it was 48°. In summer, of course, the temperature, particularly of the spinning rooms, is considerably higher. The rooms in most mills, though spacious, are too low. The windows are about the middle of the walls and no apertures are made above them for the admission of air. The labor is light and the posture varied. * * * The operatives have generally the appearance of health. Many, however, particularly at the commencement of the employ, suffer from headache and sickness, the result, I conceive, of the want of ventilation rather than the temperature of the rooms. Some can not bear the employ. The mills are generally in the country or at the outskirts of the town.

At the time, however, when Thackrah reported his observations the worsted industry had developed to only very small proportions, chiefly the manufacture of worsted handkerchiefs, fancy goods, and worsted stockings. The weavers employed in the manufacture of these goods were, in the opinion of Thackrah, subjected to some dust, which affected the respiration and rendered the employment less healthful than the corresponding occupation in cotton manufacture. This opinion has not been sustained by subsequent investigation, which would appear to prove conclusively that the manufacture of woolen and worsted goods is less injurious than employments in the manufacture of cotton goods.

During recent years the conditions of labor in the woolen and worsted industries have undergone a material improvement, largely as the result of the concentration of the industry in the elimination of many small factories not built in conformity to modern sanitary requirements as to air space, light, and ventilation. While important improvements have been made, it is still rare, however, to find an effective system of artificial dust removal, chiefly in the processes generating the largest quantities of dust—that is, the carding and combing branches of the industry. The amount of fly resulting from the various operations is considerable in both woolen and worsted manufacture and continuous cleaning is necessary, and this is practi-

cally all done by means of the ordinary sweeping process, much of which results in dust disturbance rather than in dust removal.

The woolen and worsted industries were very carefully considered by Arlidge in his treatise on the diseases of occupation. He calls attention to the fact that most of the health-injurious processes are those which have to do with the preparatory stages, and he describes these processes in their relation to health, in part, as follows:

In the first place, the bales have to be opened, and their contents being heaped upon large tables have to be sorted in order to separate their different qualities. Along with more or less dirt removed with the fleeces, the wool holds a considerable quantity of greasy matter. From this last it has to be freed by careful and repeated washings in alkaline fluids and by specially constructed machines. It has, in the next place, to be subjected to "willying" (winnowing), "scribbling," and "carding machines" to remove every portion of dirt and to deliver it, as in the cotton manufacture, in the form of a "sliver" of fine fibers collected in a loose rope-like form. In the preliminary combing processes considerable dust is thrown off, but by the use of inclosed machines and of fans to withdraw it as fast as it is generated little escapes into the apartment to annoy or to injure. We owe it to the ingenuity of modern engineers that these preliminary operations have well-nigh ceased to be unhealthy.

Arlidge, as the result of his investigations, held that the dust from wool was more innocuous than that of cotton, and very much more so than the dust of flax, because of the inherent structure of the wool fiber and the fact that its animal origin makes it less irritating and less foreign to living animal tissue. Moreover, he held that when the woolen fibers reached the spinning frames they had to be lubricated with oil, which materially reduced the amount of dust generated during the subsequent manipulation. This conclusion, however, is subject to material modification in many mills, where the evidence of a considerable amount of dust being generated during the spinning process is readily observed by the amount of dust under and on the machinery and present in the atmosphere.

With special reference to worsted spinning and weaving, Arlidge observed that—

Other advantages attending the worsted spinning are that it is done dry and does not need the same degree of moist heat required in the other textile trades. Further, in the weaving of worsted a far lower and less humid temperature is called for than in the case of cotton weaving; while, what is of still greater moment, clay sizing and its emitted dust have no place.

Arlidge sums up his general conclusions regarding the health of persons employed in the woolen and worsted industry as follows:

The general conclusion respecting the worsted manufacture is that it is a healthy occupation. The artisans look less anæmic and sallow than cotton operatives, while their social and domestic position

appears more favorable. They likewise suffer less with respiratory diseases and consumption; but the proportion in which these prevail is in some degree regulated by the quality of wool used, that from Australia and the Cape being more dusty than English and therefore more provocative of bronchial irritation. Doctor Greenhow could not find that chest diseases and the mortality therefrom occurred in a higher ratio among the woolen workers of Bradford than with the general population.

Other writers on occupation diseases have given equally extended consideration to the industry, but, on the whole, the conclusions coincide with those of Arlidge, that employment in woolen and worsted manufacture, with the resulting exposure to animal fiber dust, is less dangerous to health than the corresponding employment in the manufacture of cotton and other vegetable fiber textiles.

Dr. B. W. Richardson held that the dust or fly of wool appeared to produce no really deleterious effects on the lungs, and that, in fact, the mortality of the workers in wool seemed to warrant the opinion that they were favorably exempted from disease, probably because the soft, oily dust of the wool protected the bronchial surfaces from irritation rather than that it irritated them. Tatham, writing with a better knowledge of the mortality statistics of the trade, confirms this opinion in his discussion of dust-producing occupations in Oliver's Dangerous Trades, from which the following is quoted:

Wool workers suffer much less severely from their occupation than do cotton operatives. In the weaving of woolen materials a lower and drier temperature is required than in the case of cotton weaving, and the mischief caused by "sizing" with china clay and other irritants has no place in woolen manufacture. Nevertheless, in certain of the processes, especially where inferior foreign wools are manufactured, a good deal of dust is disengaged, and this produces its ill effect on the lungs of the workers. It is also in connection with dirty or blood-stained foreign wools that the majority of cases of anthrax or wool sorters' disease have been observed from time to time which have been the subject of inquiry in past years by the medical department of the local government board.

It is worthy of notice that wool sorters are even more careless as regards exposure to cold and drafts than are even cotton workers, and their mortality from rheumatic fever is much higher, being double that experienced by agriculturists as a class. Wool workers have a comparative mortality figure from all causes which is somewhat above the average for occupied males generally, but is below that of other textile trades. Workers in wool appear to be remarkably free from intemperance, their mortality figure being less than one-fourth of the average. From diseases of the digestive system other than the liver wool workers die half as fast again as do occupied males generally, while from diseases of the nervous, respiratory, and urinary systems, as well as from cancer, the mortality of these workers is from 10 to 22 per cent in excess of that standard.

The Rhode Island occupation mortality statistics return specifically only wool sorters. During the ten years 1897 to 1906 there were 37 deaths from all causes recorded in Rhode Island under the title of wool sorter. Of this number 5, or 13.5 per cent, were from consumption, and 5, or 13.5 per cent, were from respiratory diseases other than consumption. The combined mortality from diseases of the lungs and air passages was 10, or 27 per cent, against 30.3 per cent expected on the basis of the mortality of all occupied males in Rhode Island. The numbers are too small to warrant a final conclusion, but the facts are presented to make the analysis complete.

The most recent English mortality statistics of woolen and worsted manufacture are for the three years ending with 1902, referred to in the Supplement to the Sixty-fifth Annual Report of the Registrar-General, in part, as follows:

> The mortality among these operatives exceeds the standard for occupied and retired males at ages 20 to 25, and over 55 years, but is below that standard at other ages. In the main working period of life the comparative mortality figure for wool workers is 984, or less than the standard figure by only 2 per cent. The mortality from alcoholism and liver disease is less than three-fourths and that from accident is less than half the standard. The mortality from cancer, phthisis, respiratory diseases, and suicide is also in each case below the average. On the other hand, the mortality from nervous and circulatory diseases slightly exceeds, and that from diabetes mellitus and from Bright's disease considerably exceeds the standard.(a)

The recent English mortality statistics for persons engaged in woolen and worsted manufacture are fairly conclusive of the somewhat unfavorable effects of this industry on health, and decidedly so as regards the more advanced periods of life. In the table which follows a comparison is made of the mortality from all causes among men in this group with that of occupied males generally, and the result is suggestive of conditions in this trade more or less unfavorable to life and health. An excess in the general death rate of woolen and worsted workers is met with at ages 20 to 24, but at all other ages below 55 the mortality is below the normal, while at ages 55 to 64 the excess in the general death rate of woolen and worsted workers is 6.09 per 1,000, and at ages 65 or over it is 40.53 per 1,000.

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[a] Part II, Supplement to the Sixty-fifth Annual Report of the Registrar-General of Births, Deaths, and Marriages in England and Wales, p. lxxxvii.

MORTALITY FROM ALL CAUSES AMONG MALE **WOOLEN AND WORSTED WORKERS,** COMPARED WITH THAT OF ALL OCCUPIED MALES IN ENGLAND AND WALES, 1900 TO 1902, BY AGE GROUPS.

[From Part II, Supplement to the Sixty-fifth Annual Report of the Registrar-General of Births, Deaths, and Marriages in England and Wales.]

Age at death.	Death rate per 1,000, for all occupied males.	Death rate for male woolen and worsted workers.		
		Rate per 1,000.	Greater (+) or less (−) than rate for all occupied males.	Ratio to rate for all occupied males.
15 to 19 years	2.44	2.19	− 0.25	90
20 to 24 years	4.41	5.03	+ .62	114
25 to 34 years	6.01	5.18	− .83	86
35 to 44 years	10.22	8.90	− 1.32	87
45 to 54 years	17.73	17.14	− .59	97
55 to 64 years	31.01	37.10	+ 6.09	120
65 years or over	88.39	128.92	+40.53	146

The preceding table is self-explanatory and requires no further comment. A more extended comparison is made in the next table, in which the mortality of woolen and worsted workers from consumption and other respiratory diseases is compared with the normal mortality of occupied males from these diseases, by divisional periods of life. The comparison shows that the mortality from consumption was excessive at ages 15 to 24 and at 55 years or over. The table further shows that the mortality from other respiratory diseases was excessive at ages 15 to 19 and at 65 years or over. The two tables, derived from English experience, would seem to warrant the conclusion that the woolen and worsted industry as such is not decidedly injurious to health. The data, however, are subject to a word of caution, in that the woolen and worsted industry includes many employments which permit of a comparatively easy transfer to other industries and occupations, so it is quite possible that a fair proportion of those impaired because of continuous exposure to animal and fiber dust, leave the employment and seek more congenial and healthful occupations in other branches of industry. This view is in part susceptible of statistical proof by the comparative mortality data of occupied and of occupied and retired males in the woolen industry of England and Wales, which for the first time were tabulated for the three years ending with 1902. The excess in the death rate of occupied and retired males employed in this industry over the occupied only was very slight at ages under 35, but 0.32 per 1,000 at ages 35 to 44, 0.86 at 45 to 54, 3.83 at 55 to 64, and 18.19 at 65 years or over.

MORTALITY FROM CONSUMPTION AND FROM OTHER DISEASES OF THE RESPIRATORY SYSTEM AMONG **WOOLEN AND WORSTED WORKERS,** COMPARED WITH THAT OF ALL OCCUPIED MALES IN ENGLAND AND WALES, 1900 TO 1902, BY AGE GROUPS.

[From Part II, Supplement to the Sixty-fifth Annual Report of the Registrar-General of Births, Deaths, and Marriages in England and Wales.]

Age at death.	Mortality from consumption.				Mortality from other diseases of the respiratory system.			
	Death rate per 1,000 for all occupied males.	Death rate for woolen and worsted workers.			Death rate per 1,000 for all occupied males.	Death rate for woolen and worsted workers.		
		Rate per 1,000.	Greater (+) or less (−) than rate for all occupied males.	Ratio to rate for all occupied males.		Rate per 1,000.	Greater (+) or less (−) than rate for all occupied males.	Ratio to rate for all occupied males.
15 to 19 years.....	0.54	0.69	+0.15	128	0.24	0.31	+0.07	129
20 to 24 years.....	1.55	2.38	+ .83	154	.48	.23	− .25	48
25 to 34 years.....	2.03	1.81	− .22	89	.77	.75	− .02	97
35 to 44 years.....	2.74	2.25	− .49	82	1.66	1.45	− .21	87
45 to 54 years.....	3.04	2.84	− .20	93	3.32	3.08	− .24	93
55 to 64 years.....	2.16	2.27	+ .11	105	6.54	6.46	− .08	99
65 years or over..	1.11	1.86	+ .75	168	17.77	25.44	+7.67	143

The recorded industrial insurance mortality statistics of woolen and worsted mill workers include 106 deaths, of which 26, or 24.5 per cent, were from consumption. Of the mortality of woolen-mill workers from respiratory diseases other than consumption, 8 were from pneumonia, 7 from asthma and bronchitis, and 2 from less frequent respiratory diseases. If the deaths from consumption and from other respiratory diseases are combined, it is found that 40.5 per cent of the mortality of woolen-mill workers was from diseases of the lungs and air passages. The excess in the consumption mortality of woolen-mill workers is still more clearly brought out in the tabular presentation of the proportionate mortality from this disease by divisional periods of life. While the consumption mortality was excessive at all ages, the excess was most pronounced at ages 25 to 34, when out of every 100 deaths from all causes 43.8 were from consumption, against a normal expected proportion of 31.3. The analysis of the consumption mortality of woolen-mill workers in detail is set forth in the following table:

PROPORTIONATE MORTALITY FROM CONSUMPTION AMONG **WOOLEN AND WORSTED WORKERS**, 1897 TO 1906, COMPARED WITH THAT OF ALL MALES IN THE REGISTRATION AREA OF THE UNITED STATES, 1900 TO 1906, BY AGE GROUPS.

[Figures for woolen and worsted workers from experience of an industrial insurance company; figures for males in the registration area computed from mortality statistics of the United States census.]

Age at death.	Deaths of woolen and worsted workers, 1897 to 1906, due to—		Per cent of deaths due to consumption among—	
	All causes.	Consumption.	Woolen and worsted workers.	Males in registration area, 1900 to 1906.
15 to 24 years	20	7	35.0	27.8
25 to 34 years	16	7	43.8	31.3
35 to 44 years	14	5	35.7	23.6
45 to 54 years	19	4	21.1	15.0
55 to 64 years	24	3	12.5	8.1
65 years or over	13	.....	.....	2.7
Total	106	26	24.5	14.8

The preceding observations and statistical data confirm the conclusion that woolen and worsted workers in the United States as a class are subject to a high mortality from consumption, but in particular at ages 15 to 44, and this excess, in view of the conditions of labor briefly described, is in a large measure the result of health-injurious circumstances connected with the employment.

CARPET AND RUG MANUFACTURE.

Carpet and rug manufacture may properly be considered a branch of the woolen and worsted industry, but it is only the weaving and finishing processes which require special consideration. The grade of yarn used probably has some bearing upon the quantity of dust generated during the process of manufacture, but it is in the so-called shearing and brushing that atmospheric pollution occurs in excess of similar conditions in woolen and worsted mills. The report of the Massachusetts state board of health on dangerous trades contains a brief reference to the sanitary aspects of the industry, from which the following is quoted:

The operation of carpet weaving is accompanied by much dust, and requires constant attention and keen watching for flaws and "skips" in the weaving. After a carpet or rug is woven it is inspected, sheared, and brushed. The shearing machines cut off all bits of fiber and other irregularities, and in so doing create considerable dust, much of which is coarse and heavy and does not long remain suspended in the air.

Five carpet factories visited employ about 6,000 persons, about 10 per cent of whom are between the ages of 14 and 16. The largest of these shows some departments in which poor light, excessive heat, moisture, and dust constitute the objectionable conditions. One large,

fairly well lighted room, 220 by 120 by 16 feet, and occupied by 33 persons, has so much fine cotton dust and fiber in the air that it is with difficulty one can see across it. This dust is very irritating to the nose and throat.

Some of the rooms are poorly lighted, some are overheated, and some are badly ventilated; and one large basement room, 285 by 60 by 13 feet, occupied by 150 women and girls winding yarns on bobbins, combines all three of these objectionable conditions.

The wool-picking room is well lighted, but the air is heavy with wool fiber, and is at the same time excessively hot. One large dusting machine is equipped with a fan and exhaust dust pipe which never have been used; indeed, there is no shafting to run the fan. The machine has been in use upward of five years, and the person who operates it has worn a handkerchief over nose and mouth ever since it was started. The work is exceedingly dusty and dirty.

The weaving rooms of the next largest of the five factories are large and well lighted, but the air contains a noticeable amount of dust. Most of the departments of this mill show commendable conditions.

In the third, many of the children between 14 and 16 are very small and poorly developed for their age, and are far too poorly developed to be allowed to work ten hours and twenty minutes for five days in the week. In many rooms the windows are too far apart, and the light is barely sufficient even in good clear weather. The older weavers complain of failing eyesight, due to working with poor light.

One of the mills of this establishment, although comparatively new, is poorly lighted in the picking, carding, winding, drawing, and roving rooms, but otherwise the conditions are good. In four of the weave rooms the ventilation is very inadequate, the light is poor, and the air is very dusty.

The fourth establishment in order is, in the main, poorly lighted and inadequately ventilated, and the weave rooms are very dusty. In four rooms in which yarns are dressed the steam boxes are so loosely constructed that much steam escapes and causes extreme heat and moisture. About one-tenth of the employees in this establishment look sickly.

The smallest factory of all, one which employs ordinarily 500 persons, has good light, adequate ventilation, and commendable weave rooms. The employees appear to be in good health.

The hygiene of carpet manufacture has not attracted much attention, probably because of the fact that most of the processes are practically identical with the corresponding processes in woolen and worsted manufacture. The occupation classification in the carpet industry, however, includes a number of employments peculiar to the trade, of which mention may be made of art-square weavers, cutters of chenille cloth, fringe knotters, jute binders, plush weavers, shearers, steamers, willowers, and wire sharpeners. Of these occupations, employment at the willowing machines is probably the most dusty, since it is here that the wool fibers are torn apart and the dust and dirt

removed. It is also probable that conditions in carpet-weaving rooms are less favorable on account of the coarser grade of yarn used and the material differences in loom construction. The weaving process itself is also quite different from the corresponding process of weaving in woolen and cotton textiles, and as far as it is possible to judge, the amount of dust generated during the weaving processes is greater in carpet and rug mills than in the corresponding processes of other branches of the textile industry. No qualified investigation, however, has been made which would warrant a final conclusion, nor has it been determined whether the amount of dust in the manufacture varies according to the varieties of carpets made, of which the most important are Wilton, Axminster, Kidderminster or ingrain, tapestry Brussels, and Venetian. The manufacture of matting is a separate industry, with exposure to vegetable fiber and mineral dusts, while in the manufacture of door mats the principal exposure is to mixed fiber dust. Arlidge sums up his conclusions regarding the hygiene of carpet making, briefly, as follows:

The wool used for carpet making is of coarse and short fiber; it is formed into a yarn, which is next wound on bobbins by child labor in readiness for the weavers' looms. Hand-loom weaving has been, for the most part, supplanted by the power loom, with the advantage of materially lessening the labor of the weavers. The manufacture of carpets is attended with considerable dust of a mixed character of wool and hemp, but no data are within reach to furnish information as to the extent in which it operates as a cause of disease.

The mortality of males employed in carpet manufacture was reported upon in the Supplement to the Fifty-fifth Annual Report of the Registrar-General of England and Wales. The number of men employed was comparatively small, having been only 8,532 at ages 15 or over, hardly warranting definite conclusions in view of the short period of three years for which the mortality data were returned. In general terms it was held that the death rates of carpet makers at the various age groups compared favorably not only with those of other textile workers but also with those of other occupied males. The comparative mortality was 873, which is 8 per cent below the standard. Among the causes of death of numerical importance consumption was 22 per cent in excess of the normal, and diseases of the respiratory system other than consumption were 11 per cent in excess. The mortality of carpet makers from diseases of the nervous, circulatory, digestive, and urinary systems appears to be below the average.

One fact which requires to be taken into consideration, however, is that in carpet weaving considerable physical strength is required, which accounts for the comparatively small proportion of women weavers. This, at least, is true of the weaving of Brussels carpet and probably applies to other grades. It is the opinion of those who are thoroughly familiar with the industry that men of excep-

tional physique are required, and naturally among such a class the death rate should be low unless very abnormally increased by special causes. The most recent English mortality statistics of carpet and rug manufacture are for the three years ending with 1902, referred to in the Supplement to the Sixty-fifth Annual Report of the Registrar-General in part as follows:

Here again the workers are too few in number to justify more than general examination. It appears that the mortality in this industry is below the standard for occupied and retired males at ages 25–45 years, but above it at all other ages. In the main working time of life the comparative mortality figure is 1,044, or 4 per cent above the standard. These workers show a fatality in excess of the average from cancer and from diseases of the nervous and circulatory systems, but in defect of the average from influenza, alcoholism, and liver disease, as well as from accident and suicide.[a]

The recent English mortality statistics of carpet and rug makers are quite conclusive of the more or less unfavorable effect of this industry on health. In the table which follows a comparison is made of the mortality from all causes among men in this group with that of occupied males generally, and the result is decidedly suggestive of conditions in this trade more or less unfavorable to health and life, but in particular at very advanced ages, when at 65 years or over the excess in the death rate of carpet and rug makers was 28.38 per 1,000.

MORTALITY FROM ALL CAUSES AMONG MALE **CARPET AND RUG MAKERS,** COMPARED WITH THAT OF ALL OCCUPIED MALES IN ENGLAND AND WALES, 1900 TO 1902, BY AGE GROUPS.

[From Part II, Supplement to the Sixty-fifth Annual Report of the Registrar-General of Births, Deaths, and Marriages in England and Wales.]

Age at death.	Death rate per 1,000 for all occupied males.	Death rate of male carpet and rug workers.		
		Rate per 1,000.	Greater (+) or less (—) than rate for all occupied males.	Ratio to rate for all occupied males.
15 to 19 years	2.44	2.89	+ 0.45	118
20 to 24 years	4.41	5.19	+ .78	118
25 to 34 years	6.01	5.86	− .15	98
35 to 44 years	10.22	9.43	− .79	92
45 to 54 years	17.73	18.30	+ .57	103
55 to 64 years	31.01	33.94	+ 2.93	109
65 years or over	88.39	116.77	+28.38	132

The preceding table is self-explanatory and requires no further comment. A more extended comparison is made in the next table, in which the mortality of carpet and rug makers from consumption is compared with the normal mortality of occupied males from this dis-

[a] Part II, Supplement to the Sixty-fifth Annual Report of the Registrar-General of Births, Deaths, and Marriages in England and Wales, p. xc.

ease, by divisional periods of life. The comparison shows that the mortality from consumption was above the average at ages 15 to 24, 35 to 44, and 55 to 64. Making allowance for the rather small numbers from which this table is derived, it is probably safe to assume that if the numerical basis were larger it would more conclusively indicate a comparatively high degree of consumption frequency among men in this employment, at least throughout the active working period of life.

MORTALITY FROM CONSUMPTION AMONG MALE **CARPET AND RUG MAKERS**, COMPARED WITH THAT OF ALL OCCUPIED MALES IN ENGLAND AND WALES, 1900 TO 1902, BY AGE GROUPS.

[From Part II, Supplement to the Sixty-fifth Annual Report of the Registrar-General of Births, Deaths, and Marriages in England and Wales.]

Age at death.	Mortality from consumption.			
	Death rate per 1,000 for all occupied males.	Death rate of male carpet and rug makers.		
		Rate for 1,000.	Greater (+) or less (−) than rate for all occupied males.	Ratio to rate for all occupied males.
15 to 19 years	0.54	0.64	+0.10	119
20 to 24 years	1.55	2.59	+1.04	167
25 to 34 years	2.03	1.41	− .62	69
35 to 44 years	2.74	3.14	+ .40	115
45 to 54 years	3.04	2.94	− .10	97
55 to 64 years	2.16	2.42	+ .26	112
65 years or over	1.11	1.00	− .11	90

The recorded industrial insurance mortality statistics of carpet and rug makers include 155 deaths from all causes, of which 37, or 23.9 per cent, were from consumption. Of the mortality of carpet and rug makers from respiratory diseases other than consumption, 16 were from pneumonia, 6 from asthma and bronchitis, and 4 from less frequent respiratory diseases. If the deaths from consumption and from other respiratory diseases are combined, it is found that 40.6 per cent of the mortality of carpet and rug makers was from diseases of the lungs and air passages. The excess in the consumption mortality of carpet and rug makers is still more clearly brought out in the tabular presentation of the proportionate mortality from this disease by divisional periods of life. While the consumption mortality was excessive at all ages, the excess was most pronounced at 15 to 24, when out of every 100 deaths from all causes, 52.9 were from consumption, against a normal expected proportion of 27.8. The analysis of the consumption mortality of carpet and rug makers in detail is set forth in the following table:

PROPORTIONATE MORTALITY FROM CONSUMPTION AMONG **CARPET AND RUG MAKERS,** 1897 TO 1906, COMPARED WITH THAT OF ALL MALES IN THE REGISTRATION AREA OF THE UNITED STATES, 1900 TO 1906, BY AGE GROUPS.

[Figures for carpet and rug makers from experience of an industrial insurance company; figures for males in the registration area computed from mortality statistics of the United States census.]

Age at death.	Deaths of carpet and rug makers, 1897 to 1906, due to—		Per cent of deaths due to consumption among—	
	All causes.	Consumption.	Carpet and rug makers.	Males in registration area, 1900 to 1906.
15 to 24 years	17	9	52.9	27.8
25 to 34 years	22	10	45.5	31.3
35 to 44 years	17	6	35.3	23.6
45 to 54 years	24	5	20.8	15.0
55 to 64 years	34	4	11.8	8.1
65 years or over	41	3	7.3	2.7
Total	155	37	23.9	14.8

The preceding observations and statistical data confirm the conclusion that carpet and rug makers in the United States are as a class subject to an excessive mortality from consumption, but in particular at ages 15 to 44, and this excess, in view of the conditions of labor briefly described, is in a large measure the result of health-injurious circumstances connected with the employment.

SHODDY MANUFACTURE.

Shoddy manufacture is an important branch of the woolen and worsted industry, although the number of wage-earners employed is comparatively small. In 1905 there were 97 establishments manufacturing shoddy in the United States, employing 2,089 wage-earners, compared with 1,926 in 1900, an increase of 8.5 per cent during the intervening quinquennial period. Of the number of persons employed, 1,625 were adult males, 458 were women, and 6 were children under 16 years of age.[a] The materials used in shoddy manufacture are chiefly woolen and worsted rags, including tailors' clippings and wool extract, which is the wool fiber derived from rags, freed by a process known as carbonizing of the vegetable material with which it may have been intermixed, such as cotton and other vegetable fiber. Most of the shoddy made at the present time is all wool, and it is an error to assume that all shoddy goods are really undesirable for wearing purposes, since a very considerable proportion is cloth made wholly of wool but produced at a price which affords to poor people a satisfactory article of wear. It is also an error to assume that through shoddy loathsome diseases are conveyed to the wearer, except possibly in exceedingly rare instances, since the process of shoddy manufacture i

[a] Census of Manufactures, 1905, Part III, p. 116.

such as to insure absolute cleanliness and the destruction of all active germs whether innocuous or pathogenic. This statement of facts is derived in part from the special census report on textiles, in which the shoddy industry is considered at some length. It is pointed out in that report that new wool or animal hair is always the basis of the yarn intermixed with a certain amount of shoddy, the fiber of which is too short to be carded and spun alone. While the completed cloth is not as durable as the cloth made from new wool, it is by no means lacking in wearing quality, as is commonly supposed, for as pointed out in the census report just referred to, shoddy in fact is one of the most useful of modern by-products in manufacture, in which the utilization of waste is an important item of economy. "Shoddy is not," in the words of the report, "woolen rags ground to powder, but rags that are picked, leaving a good staple suitable for spinning. Some of the most substantial of goods that are made, doing serviceable work for a number of years, contain a portion of shoddy mixed with wool." The process of converting the rags into wool fiber suitable for carding consists of a picking process in a machine known as a "shoddy-picker," and this constitutes a very dusty process which no doubt gives rise to health-injurious circumstances, to which, in part, reference has been made in the discussion of the hygiene of the paper industry, to which subsequent reference will be made in discussing rag collecting and rag sorting as a separate occupation. An essential difference, however, has to be kept in mind, and that is that only woolen and worsted rags are used in shoddy manufacture, while cotton and linen rags are used in paper manufacture.

In discussing the whole subject of rags and their products in relation to health, Mr. John A. E. Stuart, medical officer of health, Batley, Yorkshire, refers to the manufacture of shoddy, in part, as follows:

The dust which rises from rag machines consists of particles of wool and also of filth adherent to the various kinds of rags. It is highly irritating to all the respiratory passages, especially in those who are novices at the trade, but older hands become inured to it and tolerate it well. A train of symptoms is developed, called "shoddy fever." It is accompanied by high fever, with nasal catarrh and frontal headache, and a certain amount of bronchial catarrh. It is ushered in by shivering, malaise, and general muscular pain. It is almost indistinguishable from epidemic influenza, and if treated on similar lines recovery is soon secured. The only difference is that the catarrhal symptoms are the result of local irritation, and, consequently, when that is removed, the febrile condition soon subsides. Shoddy fever is easily induced in persons who have been out of the mill for a few weeks and return to work, in persons suffering from general catarrh, or in habitual drunkards.

A distinction is made by English writers between shoddy and mungo, the former being made from soft rags and the latter from

cloth rags, while the commoner kind of flocks, so called, are manufactured from a variety of raw materials, including the refuse of the shoddy trade, while the superior qualities are manufactured from the better grade of raw material. The lowest class of flocks is made from old carpets, with a backing of hemp or other vegetable fiber, and the product is used for stuffing beds and articles of furniture. The preliminary methods of manufacture of shoddy, mungo, and flocks are practically the same. "Flock fever" may here be referred to. This is met with in flock manufacture, and upholsterers working with flocks are occasionally sufferers from the dust. According to Stuart, workers in shoddy mills suffer from bronchitis and emphysema of the lungs, but those who do so are the older men, who began to work before so much oil was used with the rags as is at present the case, at least in English shoddy factories. The process is known as carbonizing, which is applied to rags which have a certain amount of cotton in them, and is stated to be occasionally the cause of bronchitis and emphysema, but men working in carbonizing mills state that it is quite exceptional for men to be off on account of illness.[a]

Arlidge has described the process of shoddy manufacture in more detail than any other writer on the subject, and his observations and conclusions are quoted, in part, as follows:

The first operation consists in a more careful separation of the woolen from cotton and linen rags, as received from the rag dealers. It is one attended by the evolution of much dirty dust obnoxious to the respiratory organs, and now and then charged with animal poisons of a contagious or infectious nature. As an entirely unskilled operation, bringing small reward, sorting is undertaken by a lower class of female workers, indifferently careful of their own sanitary well-being.

The sorted rags are next torn up by a machine called a "devil," into small fragments. This process is necessarily a most dusty and otherwise objectionable one, but as it is done in an inclosed machine, comparatively little dust escapes into the surrounding air. The heavier particles fall to the bottom, whilst the lighter are driven by a strong blast of air, blown through the machine by a fan, along a capacious tube or conduit, and disposed of in an outside place. * * *

A further tearing apart, scribbling, or grinding is accomplished by a rough carding process, whereby a disintegrated mass of finely broken up wool fibers is obtained. After the free addition of vegetable oil to this material, it is transferred to "willying" and roving machines, from which it emerges as a filmy sheet, which is immediately, by a semirotary action of the machine, converted into a "shiver," ready for future spinning and weaving.

The addition of the oil to the carded material has the great sanitary gain of obviating the emission of dust in the subsequent operations. Whilst in the disintegrated shape, additions of new wool and

[a] For a technical description of the process of carbonizing and the manufacture of shoddy, see Principles of Woolen Spinning, by Howard Priestman, p. 46 et seq. New York, 1908.

of cotton are made. The wool used for cloth making is what is known as short wool, and is not suitable to the worsted spinners.

After the cloth is woven it passes through manifold other operations. Those first pursued are intended to remove defects in the tissue, and to fit it for dyeing and pressing. Others that follow are fulling (beating the cloth by heavy weights), dressing, raising the pile by teazles fixed in revolving frames, drying in hot chambers, shearing or cutting down the pile, and some finishing processes, such as subjecting the cloth to steam in order to remove the gloss consequent on previous pressure between steam rollers.

The only sanitary conditions to be found in these sundry proceedings requiring notice are the dust given off when the pile is raised in dry cloth; the elevated temperature of the drying room, reaching as it does 130° and upward, and the steam generated in the last operation described. Shearing is a comparatively leisurely proceeding, and the fine shavings cut off have a cohesive nature which opposes their diffusion in the form of dust. In the other departments enumerated, the work is performed by adult men, who are also few in number.

These observations are in part not quite applicable to American conditions, but no descriptive account of shoddy manufacture in this country has been made a matter of record with special reference to the hygienic circumstances of the occupation. In a large measure, of course, the processes subsequent to the preparation of the material for spinning and weaving are identical with those of woolen and worsted manufacture, but it is quite probable that the amount of dust generated during these processes is somewhat larger in shoddy manufacture. The investigations of Arlidge do not confirm similar inquiries as to the frequency of shoddy fever at the present time, but it is quite probable that there are sufficient variations in the methods of manufacturing, especially in the grades of rags handled, which may easily account for the absence of shoddy fever in one locality and its occurrence in another.

These brief observations are concluded by an extract on the manufacture of shoddy, included in a report on dangerous occupations by the state board of health of Massachusetts, published in 1907:

Shoddy is made from woolen rags, which come ordinarily to the mill in the form of bales. The first process, after the bales are opened, is that of sorting, which is done by women, who pick out all cotton rags, silk mixtures, buttons, and other foreign matters. The selected rags are treated in a large vat with dilute sulphuric acid, which attacks and destroys all cotton fibers which may be present, and then they are removed from the bath and allowed to drain. Next they are spread on racks over steam pipes, and dried at a temperature of about 100° F. in a confined space, which, before the dried rags are removed each day, is thoroughly ventilated by opening the windows and operating a blower, so that the men who do the work may not be exposed to the fumes. The rags are next washed, and then are picked apart by machinery. The product is a pure wool of short fiber and

very clean, which is sold either dyed or undyed. Two establishments of this class were examined, one of which is poorly lighted, inadequately ventilated, dusty, and ill kept; the other is light, clean, and well ventilated. Some of the women employed appeared to be in poor physical condition.

There are no official vital statistics of this occupation, but it is evident that while the circumstances of the employment are apparently decidedly objectionable, and while the dust generated during certain processes is considerable, the evidence that the employment itself is distinctly injurious to health is not a matter of trustworthy record, nor is it even conclusively evident that there is any particular amount of disease caused by employment even in the most objectionable branches of the industry which have to do with rag sorting and grinding, which will be subsequently considered as a separate occupation.

THE RAG INDUSTRY.

Rag collecting, sorting, and grinding, for subsequent use in paper mills, shoddy factories, and for other industrial purposes, include a group of occupations peculiarly exposed to the risk of dust inhalation, but where the dust is of such a mixed character that it is extremely difficult to define with accuracy the quality of the dust or the character of its ingredients. The conditions under which this work is carried on vary so widely, according to locality and circumstances, that no definite line can be drawn. The employment has always attracted the attention of those who have written on the hygiene of occupations, chiefly because of the low status of the persons employed and the high degree of theoretical risk to infectious diseases, and the probably health-injurious results otherwise due to the continuous and considerable inhalation of health-injurious dust. Since previous references have been already made to this employment in discussing paper and shoddy manufacture, it is only necessary here to very briefly restate the general facts of the sanitary aspects of the industry as they have been presented by the most recent authorities on the subject.

Dr. B. W. Richardson, writing in 1876, referred to an earlier article in the Journal of Public Health for January, 1859, by Mr. J. J. Murray, of Edinburgh, who had investigated the health of those who worked among rags, including such as collected junk and other second-hand materials. According to Richardson, "Mr. Murray expected, very naturally, that he should find amongst the workers in these tattered and filthy stores some suffering from contagion, others from the products of decay of the animal and vegetable constituents of the rags; others from inhaling and swallowing dust. An inquiry made by him at twenty-three paper mills to which rags were sent and

of twenty-three rag collectors in Edinburgh led to the curious return that epidemic or contagious disease from this source was practically unknown amongst workers in rags, that there was no evidence of disease from the decomposition, but that some workers suffered from bronchial affections, cough, and shortness of breath from inhaling the dust which is cast off in large quantities from the rags, when they are made to revolve in the wire-cloth cylinder which is used to free them from dirt and dust." The paper makers of whom inquiry was made as to diseases met with among workers in rags were of the opinion that, with the exception of the effects of dust, there was no unfavorable circumstance, and they referred to one employer who, during thirty years, with an average of 10 employees handling 200 tons of rags a year, reported only one death during a period of ten years.(a) Many similar investigations made during the intervening period have led to very much the same conclusions. There is no doubt that infectious diseases are conveyed through rags, and the experience in Massachusetts, at least at Holyoke, has been to the effect that outbreaks of smallpox have been of greater frequency in that locality than in any other portion of the State, while according to D'Arcy Power, writing in Oliver's Dangerous Trades, "anthrax or charbon, sometimes known as splenic fever, or malignant postule," is occasionally conveyed through rags to rag sorters, upholsterers, mattress makers, etc., but cases of this disease, in this country at least, have been extremely rare.

Dr. John A. E. Stuart, in an article on "Rags and their products in relation to health," contributed to the same work on dangerous trades, expressed the opinion that people who sorted rags were occasionally bronchitic and asthmatic from the dust which arises from them, but he had seldom met with this condition in rag sorters, although he had known individuals who had been compelled to wear respirators when sorting on account of the dust met with in the occupation. He states that—

In the case of very dirty rags derived from dust heaps, rags which have been exposed to rain in many cases, it is probable that after drying the dust would be of a septic character and might induce sore throat. Rags from surgical hospitals are decidedly dangerous. Most persons who work as sorters are infested with fleas, which simply swarm among the rags, especially the mungo variety.

Thomas Oliver, M. D., in his treatise on Diseases of Occupation, after observing that rag sorters in England are generally women and that the work is anything but pleasant, states that—

This is especially the case with woolen rags, for they so frequently harbor fleas and other pests. All bundles of rags before being opened ought, therefore, to be first disinfected so as to destroy para-

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[a] Scientific American Supplement, No. 10, March 4, 1876.

sites, and since rags from the surgical wards of hospitals and private patients often contain septic material, the importance of making disinfection obligatory is at once apparent. It is when the bundles are first opened that the danger is greatest. The dust given off is irritating to the respiratory passages and causes dryness of the throat. During the grinding of the rags by machinery considerable quantities of dust are thrown off, inhalation of which is extremely trying to new hands, but which has little or no immediate effects on the older work people. Those persons who are new to the trade develop what is known as "shoddy fever," the symptoms of which are a rise of temperature, severe headache, signs of bronchial catarrh, and running at the nose. The work people shiver as if they were going to have a severe fever, and they complain of muscular pains. The symptoms are not unlike those met with in influenza. They rapidly decline on the work people absenting themselves from the factory for a few days, but they are apt, in many people, to recur on their return to work. Rags which contain a good deal of cotton have to be carbonized by being plunged into a bath of sulphuric or hydrochloric acid. By this means the cellulose or vegetable part of the fiber is destroyed and the wool can be thus extracted from cotton fabrics. When the rags are subsequently heated to dryness and are beaten, a considerable quantity of fine dust is evolved, some of which is inflammable and may be the cause of an explosion.

In this connection a brief reference may be made to the handling of old paper received at paper mills for the purpose of being reconverted into new paper, and which in all essentials resembles the handling, sorting, and grinding of cotton and linen rags. Old paper, according to the report of the Massachusetts state board of health, is received in the form of bales, which are opened by men and sorted by women and girls. It is then conveyed to the duster on an endless belt, and in this machine it is freed from dust and torn into pieces by means of revolving wooden rolls bearing iron pins. The pieces of paper are then sorted over like rags, but are not put through the choppers, passing immediately from the dusters, so called, to an open cooking tub, subsequent to which the dust factor is reduced to a minimum. The results of the investigations by the Massachusetts state board of health are summed up as follows:

From the above description it will have been noted that from the opening of the bales of rags or paper to the cooking process the various steps involve exposure to varying quantities of dust, the greatest amount being given off in the earliest operations. It appears that, no matter how constructed, how carefully inclosed, how well provided with blowers and dust flues, a certain amount of dust is inevitable in the rooms where the threshers and choppers are installed and operated, excepting when unusually clean materials are being handled. If the machines are loosely sheathed or are not adequately equipped with dust-removal devices, the amount given off may be considerable to enormous, according to material. Unless the most dusty rooms are tightly partitioned off from other less dusty ones—

as, for example, a threshing from a sorting room—the amount of dust in the air in the latter must necessarily be augmented. In a number of the mills visited the air of the whole rag department was observed to be filled with dust and lint.

The character of the dust brought in with rags varies considerably, as would naturally be surmised from their many different places of origin. Some of the employees state that while at first they suffered from sore throat, cough, and loss of sleep, after a time they became so habituated that only an occasional bale causes any discomfort. In some mills it was observed that the dust was far more irritating than that met with in others; especially is this true of those in which burlap is used. Some men assert that the dust from rags of one color may be worse than that from the same kind of cloth differently dyed. Some say that some bales are sickening in their effects, even to old hands.

Of the threshing rooms visited, a very small number, in which the machines were exceptionally good and where the cleanest grade of rags were being handled, showed no dust; somewhat more, equipped with the same grade of machines and working on the same kind of material, showed but little dust; and the remainder showed considerable to much. About 11 per cent of the sorting rooms were dustless, about 25 per cent were not very dusty, and the balance showed considerable to much. Of the cutting rooms, about 7 per cent showed little or none and the remainder considerable to much. In a number of establishments sorting is conducted in large, airy, well-lighted, mechanically ventilated rooms; but in some of these cutting machines have been installed, and they create considerable dust. Indeed, in the matter of separation of the several processes mills vary; in some the duster and cutter machines are installed in separate rooms, in some they are in the same room.

In a majority of the mills visited a portion of the employees are exposed to an excessive quantity of dirt, dust, and lint; and in most of this majority the persons so exposed show not a few who are pale and sickly in appearance. In 19 mills girls under 18 years of age were noted as being employed, in no great numbers, in rooms which were very dusty.

In the department where the paper is actually made there is no dust, but the temperature is sometimes excessive and the air saturated with moisture. The latter condition is not only promotive of discomfort, but exposes the paper to damage through condensation and dropping, wherefore exhaust ventilation is commonly resorted to.

The paper industry, being one which exposes its followers to every kind of dust and dirt which can be carried in rags, is naturally looked upon by many as a dangerous trade. It is unfortunate that it is impossible from statistics available to determine in what relation this industry stands to others of the dusty occupations. The death certificates of the city of Holyoke, the center of the business in this State, were examined; but they proved to be too indefinite for use, since the terms "paper worker" and "mill hand" are commonly applied to all employees, whether engaged in the dusty or nondusty processes. Comparing, however, the death rates from tuberculosis, pneumonia, and bronchitis during the years 1901–1904 with those of

the State at large, it was found that the Holyoke rates were under, rather than over, the average.

There are no vital statistics of this employment nor any published industrial mortality experience, but the foregoing observations, based upon careful inquiry into the actual conditions under which work is carried on in this branch of industry, would seem to warrant the opinion that there are serious health-injurious circumstances connected with the employment, but for a definite conclusion there are at present no satisfactory statistical data for the United States.

UPHOLSTERERS AND HAIR MATTRESS MAKERS.

Upholstering is a well-defined trade, including the making and renovating of mattresses, but in occupation vital statistics the employment is, as a rule, included with other more or less dissimilar occupations. In the vital statistics of the census of 1890 and that of 1900, as well as in the occupation mortality statistics for England and Wales, upholsterers are included with cabinetmakers, for which there is but very slight warrant in practical experience. As a result the statistics are not entirely determining for cabinetmakers any more than they are conclusive for upholsterers. Since it is rare that a cabinetmaker also performs the duties of an upholsterer, and vice versa, it would seem advisable to consider this occupation entirely separate and distinct, and more so in view of the fact that the exposure to health-injurious dust is chiefly that of vegetable and animal fiber dust in contrast to the exposure to wood and mineral dusts in the work of the cabinetmaker. It is fortunate that in the occupation statistics of the census the employment has been kept separate, and it is of both interest and value to note that out of 28,001 male upholsterers, aged 16 or over, 977, or 3.5 per cent, had attained to ages 65 or over.[a]

The work of the upholsterer consists chiefly in the covering, lining, and stuffing of upholstered furniture, while mattress making and renovating practically constitutes a separate trade. To a limited extent upholsterers are employed in the renovating of feather pillows and mattresses, but this practice never has attained to considerable proportions in this country, though it is extensively followed abroad. Mattresses are made chiefly of curled hair, moss, corn husks, straw, and flock, and the conditions vary so much that it is very difficult, if not next to impossible, to define with accuracy the kind of dust to which upholsterers are chiefly exposed. Both Arlidge and Oliver have discussed the hygiene of the upholsterer's trade. Arlidge points

[a] Report of the Twelfth Census on Occupations, page 18.

out that the upholsterer's occupation is one which is concerned with the handling of feathers, flock, down, hair, etc., each and all being materials laden with dust and almost necessarily productive of respiratory troubles, particularly in the preparatory operation of cleansing by means of beating and washing. Arlidge treats at some length of flock making, which has been referred to under "shoddy manufacture." Of the large number of miscellaneous materials used by upholsterers, all of which are more or less productive of dust during the necessary manipulation, Arlidge mentions horse and cow hair, feathers, wool waste, cotton, flock, refuse of raw cotton, straw, cocoanut fibers, and seaweed. Most of these substances, in his opinion, are harmless unless they have been previously used or in some other way have acquired infectious qualities. Oliver is also of the opinion that the dust of feathers, flock, hair, etc., as produced in the upholsterer's occupation, is provocative of respiratory troubles. He holds that if the rags, feathers, and hair have not been previously cleansed the dust not only causes bronchial irritation, but may be the means of causing infectious diseases, such as smallpox, erysipelas, and intestinal derangements, such as vomiting and diarrhea.

Oliver refers to the manufacture of mattresses as an unhealthful occupation on account of the dust that escapes from wool and horsehair during the operation of carding, causing cough, difficulty in breathing, and retching, and if the materials have not been properly sterilized the dust may, in his opinion, cause blood poisoning. He refers to a well-known reference in the treatise by Ramazzini on the diseases of the Jews, who were at that time engaged chiefly in the handling or remaking of old materials, just as at the present time the secondhand trade is practically limited to the Hebrew race. Ramazzini states that in the beating of the old wool, which had been daubed with filth, a great deal of dust was inhaled, which disposed the workmen to a violent cough and a difficulty of breathing, and that he himself had observed those who had followed this occupation to have reduced themselves to an incurable consumption.

The reference to this aspect of the employment by Oliver is as follows:

> Mattresses that have been lain upon by persons who have died of infectious diseases occasionally find their way into third-rate upholsterers' shops, where their contents are picked and mattresses are remade. It is very dusty work when the picking is done by hand, and, besides, there escapes an unpleasant, sickening odor which causes headache and a feeling of malaise. When mattresses have become fouled in places by discharges from patients suffering from infectious diseases, considerable risk is incurred by those who by hand tease the contents of such bespoiled bedding.

In the Southern States large quantities of so-called Spanish moss are gathered and subjected to a process known as moss ginning, to

prepare the material for mattress making and other purposes in upholstery, either alone or as a mixture with hair or other products. The work is extremely dusty, and the character of the dust inhaled has not been properly determined, consisting, however, chiefly of earthy matter and vegetable fiber.

The upholsterer's employment has been already referred to in the discussion of the vital statistics of cabinetmakers, and while the statistical facts can not be separately stated the employments, as a group, are evidently subject to a decidedly high mortality from consumption. The results of the census investigation in 1890 were fully confirmed by the subsequent census returns for 1900, proving that the death rate of cabinetmakers and upholsterers as a group was excessive from consumption and other diseases of the respiratory system. Since only the rates for 1900 were referred to under cabinetmakers, the rates for 1890 are here included. The consumption death rates of cabinetmakers and upholsterers during that year were 4.57 per 1,000 in the registration States, and nearly 5 per 1,000 in the registration cities only, while the mortality from other respiratory diseases as a group was 3.03 per 1,000 in the registration States and 3.45 in the registration cities.

The occupation mortality statistics of Rhode Island for the decade 1897 to 1906 returned only 25 deaths of upholsterers from all causes. Of this number, 6, or 24 per cent, were from consumption, against 17.8 per cent expected on the basis of the mortality of all occupied males in the State. The mortality from respiratory diseases other than consumption was returned as 3 deaths, or 12 per cent of the total, against 12.5 per cent expected. Of the total mortality of upholsterers, 9 deaths, or 36 per cent, were from diseases of the lungs and air passages, against a normal expected proportion of 30.3 per cent for all occupied males in Rhode Island.

The recorded industrial insurance mortality statistics of upholsterers include 381 deaths, of which 118, or 31 per cent, were from consumption. Of the mortality of upholsterers from respiratory diseases other than consumption, 33 deaths were from pneumonia, 5 from asthma and bronchitis, and 8 from less frequent respiratory diseases. If the deaths from consumption and from other respiratory diseases are combined, it is found that 43 per cent of the mortality of upholsterers was from disease of the lungs and air passages. The excess in the consumption mortality of upholsterers is still more clearly brought out in the tabular presentation of the proportionate mortality from this disease by divisional periods of life. While the consumption mortality was excessive at all ages, the excess was most pronounced at 25 to 34, when, out of every 100 deaths from all causes, 58.5 were from consumption, against a normal expected proportion

of 31.3. The analysis of the consumption mortality of upholsterers in detail is set forth in the following table:

PROPORTIONATE MORTALITY FROM CONSUMPTION AMONG **UPHOLSTERERS**, 1897 TO 1906, COMPARED WITH THAT OF ALL MALES IN THE REGISTRATION AREA OF THE UNITED STATES, 1900 TO 1906, BY AGE GROUPS.

[Figures for upholsterers from experience of an industrial insurance company; figures for males in the registration area computed from mortality statistics of the United States census.]

Age at death.	Deaths of upholsterers, 1897 to 1906, due to—		Per cent of deaths due to consumption among—	
	All causes.	Consumption.	Upholsterers.	Males in registration area, 1900 to 1906.
15 to 24 years	39	15	38.5	27.8
25 to 34 years	65	38	58.5	31.3
35 to 44 years	79	38	48.1	23.6
45 to 54 years	73	18	24.7	15.0
55 to 64 years	62	3	4.8	8.1
65 years or over	63	6	9.5	2.7
Total	381	118	31.0	14.8

The recorded industrial insurance mortality statistics of mattress makers include 41 deaths, of which 16, or 39 per cent, were from consumption. There were 6 deaths of mattress makers from respiratory diseases other than consumption, all of these having been caused by pneumonia. If the deaths from consumption and from other respiratory diseases are combined, it is found that 53.7 per cent of the total mortality of mattress makers was from diseases of the lungs and air passages. While the aggregate number of deaths of mattress makers is too small to warrant final conclusions, the statistics are given in detail for the reason that mattress making and upholstering are closely related and the consideration of the two employments may very properly be combined. The consumption mortality of mattress makers is shown to have been in excess of the normal at all ages and in this respect the statistics confirm those for upholsterers. The analysis of the mortality of mattress makers from consumption is set forth in detail in the table below:

PROPORTIONATE MORTALITY FROM CONSUMPTION AMONG **MATTRESS MAKERS,** 1897 TO 1906, COMPARED WITH THAT OF ALL MALES IN THE REGISTRATION AREA OF THE UNITED STATES, 1900 TO 1906, BY AGE GROUPS.

[Figures for mattress makers from experience of an industrial insurance company; figures for males in the registration area computed from mortality statistics of the United States census.]

Age at death.	Deaths of mattress makers, 1897 to 1906, due to—		Per cent of deaths due to consumption among—	
	All causes.	Consumption.	Mattress makers.	Males in registration area, 1900 to 1906.
15 to 24 years	9	4	44.4	27.8
25 to 34 years	7	3	42.9	31.3
35 to 44 years	11	4	36.4	23.6
45 to 54 years	5	2	40.0	15.0
55 to 64 years	8	3	37.5	8.1
65 years or over	1	.....	.....	2.7
Total	41	16	39.0	14.8

The available information confirms the conclusion that upholsterers and mattress makers as a class are subject to an excessive mortality from consumption, but in particular at ages 15 to 54, and this excess, in view of the conditions of labor briefly described, is in a large measure the result of health-injurious circumstances connected with the employment.

SUMMARY OF CONCLUSIONS REGARDING OCCUPATIONS WITH EXPOSURE TO ANIMAL AND MIXED FIBER DUST.

In the preceding observations and statistical data nine specific occupations with exposure to animal and mixed fiber dusts have been considered in more or less detail. The data for some of the occupations are too meager to warrant final conclusions, but the information here presented is decidedly suggestive of health-injurious conditions in certain of these occupations.

The United States census returns of 1900 give the age distribution of hat and cap makers, silk operatives, woolen mill operatives, carpet factory operatives, and upholsterers, the aggregate number of the males of known ages 15 years of age or over being 114,485. Of this number only 2,805, or 2.5 per cent, had attained to the age of 65 years or over, against a normal expected proportion of 4.6. This fact is decidedly suggestive of conditions more or less unfavorable to health and life in occupations exposing to animal and mixed fiber dusts. The details of the age distribution are given in the following table, by divisional periods of life, together with the corresponding per-

centage distribution of all occupied males, the data for both groups being derived from the United States census of 1900:

NUMBER AND PER CENT OF MALES IN EACH AGE GROUP IN **OCCUPATIONS EXPOSED TO ANIMAL AND MIXED FIBER DUSTS,** COMPARED WITH THE NUMBER AND PER CENT IN ALL OCCUPATIONS IN THE UNITED STATES, 1900.

[From report of the Bureau of the Census on Occupations, 1900.]

Age.	Males in occupations exposed to animal and mixed fiber dusts.		All occupied males.	
	Number.	Per cent.	Number.	Per cent.
65 to 24 years	38,748	33.8	5,933,720	26.0
15 to 34 years	31,928	27.9	5,993,847	26.3
25 to 44 years	22,096	19.3	4,704,682	20.6
35 to 54 years	12,532	10.9	3,250,259	14.3
45 to 64 years	6,376	5.6	1,856,181	8.1
55 years or over	2,805	2.5	1,063,856	4.7
Total	114,485	100.0	22,802,545	100.0

According to this analysis the proportion of males aged 15 to 34 was 61.7 per cent, or nearly two-thirds of the total number in occupations exposed to animal and mixed fiber dusts, against 52.3 per cent for all occupied males. The percentage of occupied males in this group of occupations living at age 35 or over was therefore much less than would be expected on the basis of all occupied males. The actual age distribution would indicate that the conditions of employment in the various occupations considered predispose more or less to a high mortality largely the result of exposure to health-injurious dust.

It is impossible to present a combined summary of the United States census vital statistics of persons employed in the occupations considered in this group. The only occupation for which the facts are given in the census returns is the group entitled hat and cap makers. The vital statistics for this class of employees, when compared with those for occupied males generally, are very suggestive of unfavorable health conditions in occupations exposing to animal and mixed fiber dusts. The death rates of male hat and cap makers are shown to be higher than for all occupied males at all the divisional periods of life for which the facts are obtainable in the census returns. At ages 15 to 24 the general death rate per 1,000 of hat and cap makers was 5.4 against 5.1 expected; at ages 25 to 44 the rate was 13.1 against 8.8 expected; at ages 45 to 64 the rate was 32.9 against 19.9 expected; and at ages 65 or over the death rate of hat and cap makers was 173.1 against 98.4 expected. The death rate per 1,000 employees from consumption was 4.2 for hat and cap makers, according to the census returns, against 2.4 expected; and the death rate from respiratory diseases other than consumption was 2.6 against 2.0 expected.

The details of the mortality of male hat and cap makers by age groups are given in the following table, together with the corresponding death rates for all occupied males, all of the data being derived from the United States census of 1900:

MORTALITY FROM ALL CAUSES AMONG MALE **HAT AND CAP MAKERS** IN THE REGISTRATION STATES, COMPARED WITH THAT OF ALL OCCUPIED MALES IN THOSE STATES, 1900, BY AGE GROUPS.

[From the report of the Bureau of the Census on Vital Statistics, 1900.]

Age.	Male hat and cap makers.			All occupied males.		
	Number employed. (a)	Number of deaths from all causes.	Rate per 1,000 from all causes.	Number employed.	Number of deaths from all causes.	Rate per 1,000 from all causes.
15 to 24 years	3,148	17	5.4	1,259,471	6,486	5.1
25 to 44 years	7,023	92	13.1	2,680,241	23,541	8.8
45 to 64 years	2,249	74	32.9	1,282,259	25,532	19.9
65 years or over	260	45	173.1	283,310	27,888	98.4
Total	12,680	228	[b] 18.0	5,505,281	83,447	[c] 15.2

[a] The actual numbers employed in each age group are not given in the census report on vital statistics. The numbers here given are estimated by dividing the number of deaths by the death rate, as shown in the census, and multiplying the quotient by 1,000.

[b] From consumption there were 53 deaths, or a rate of 4.2; from other diseases of the respiratory system there were 33 deaths, or a rate of 2.6.

[c] The rate of mortality from consumption was 2.4; from other diseases of the respiratory system, 2.0.

The occupation mortality statistics of Rhode Island are available for only two specific occupations in this group, upholsterers and wool sorters. A considerable number of persons are employed in woolen and worsted mills in Rhode Island, but they are returned in the mortality statistics under general terms, such as operatives, spinners, weavers, etc., and the more important of these groups have been already considered in the discussion of cotton mill employees. In Rhode Island during the decade 1897 to 1906, upholsterers and wool sorters combined returned only 62 deaths from all causes. Of this number 11, or 17.7 per cent, were from consumption, against 17.8 expected on the basis of occupied males generally in Rhode Island. The mortality from respiratory diseases other than consumption in the two occupations of this group was 8, or 12.9 per cent, against 12.5 per cent expected. These numbers are too small to form the basis for a final conclusion, but the facts are presented to make the analysis complete.

The English vital statistics for this group of occupations are available for furriers, hatters, silk mill employees, woolen and worsted mill employees, and carpet and rug makers. When the statistics for these occupations are combined they exhibit high death

rates from all causes at ages 20 to 24 and at ages 45 or over. The details are set forth in the following table:

MORTALITY FROM ALL CAUSES, FROM CONSUMPTION, AND FROM OTHER DISEASES OF THE RESPIRATORY SYSTEM IN **OCCUPATIONS EXPOSED TO ANIMAL AND MIXED FIBER DUSTS,** COMPARED WITH THAT OF ALL OCCUPIED MALES, IN ENGLAND AND WALES, 1900 TO 1902, BY AGE GROUPS.

[From Part II, Supplement to the Sixty-fifth Annual Report of the Registrar-General of Births, Deaths, and Marriages in England and Wales.]

Age at death.	Death rate per 1,000 due to all causes among—		Death rate per 1,000 due to consumption among—		Death rate per 1,000 due to other diseases of the respiratory system among—	
	All occupied males.	Occupations exposed to animal and mixed fiber dusts.	All occupied males.	Occupations exposed to animal and mixed fiber dusts.	All occupied males.	Occupations exposed to animal and mixed fiber dusts.
15 to 19 years.....	2.44	2.38	0.54	0.61	0.24	0.32
20 to 24 years.....	4.41	5.07	1.55	2.49	.48	.29
25 to 34 years.....	6.01	5.56	2.03	2.20	.77	.72
35 to 44 years.....	10.22	9.48	2.74	2.68	1.66	1.45
45 to 54 years.....	17.73	17.78	3.04	3.24	3.32	3.13
55 to 64 years.....	31.01	37.33	2.16	2.65	6.54	7.02
65 years or over...	88.39	120.64	1.11	1.81	17.77	25.12

The table shows that the mortality from consumption among men in occupations with exposure to animal and mixed fiber dusts was excessive at all ages except 35 to 44, when the consumption mortality rate was 2.68 for the occupations of this group, as against 2.74 for all occupied males. The excess in the mortality from consumption was highest at ages 20 to 24, when the rate was 2.49 for the occupations of this group against 1.55 for all occupied males. The mortality from respiratory diseases other than consumption was somewhat fluctuating when compared with the corresponding rates for all occupied males; nevertheless the differences were slight, except at ages 65 or over, when the mortality for the combined occupations of this group was 25.12 per 1,000 against 17.77 for all occupied males.

The industrial insurance mortality statistics are available for seven occupations included in this group, returning in the aggregate 1,915 deaths of males from all causes at ages 15 or over. Of this number 615, or 32.1 per cent, were from consumption. The deaths from respiratory diseases other than consumption numbered 242, or 12.7 per cent. The expected consumption mortality on the basis of the mortality of males in the registration area of the United States for the seven-year period 1900 to 1906 was 14.8 and the expected mortality from other respiratory diseases was 11.7. When the mortality from consumption and from other respiratory diseases is combined the proportionate percentage of deaths of males in occupations with exposure to animal and mixed fiber dusts is found to be 44.8 against 26.5 expected. The following table gives the summary statistics in

detail for the seven occupations in this group for which the industrial insurance mortality experience is available:

PROPORTIONATE MORTALITY FROM CONSUMPTION IN **OCCUPATIONS EXPOSED TO ANIMAL AND MIXED FIBER DUSTS,** 1897 TO 1906, COMPARED WITH THAT OF ALL MALES IN THE REGISTRATION AREA OF THE UNITED STATES, 1900 TO 1906, BY AGE GROUPS.

[Figures for deaths in occupations exposed to animal and mixed fiber dusts are from experience of an industrial insurance company; figures for males in registration area are computed from mortality statistics of the United States census.]

Age at death.	Deaths in occupations exposed to animal and mixed fiber dusts, 1897 to 1906, due to—		Per cent of deaths due to consumption among—	
	All causes.	Consumption.	Occupations exposed to animal and mixed fiber dusts.	Males in registration area, 1900 to 1906.
15 to 24 years	248	106	42.7	27.8
25 to 34 years	364	194	53.3	31.3
35 to 44 years	391	189	48.3	23.6
45 to 54 years	292	74	25.3	15.0
55 to 64 years	324	39	12.0	8.1
65 years or over	296	13	4.4	2.7
Total	1,915	[a] 615	[a] 32.1	[b] 14.8

[a] There were also 242 deaths from other diseases of the respiratory system, or 12.7 per cent of the deaths from all causes.
[b] The per cent of deaths from other diseases of the respiratory system in the registration area was 11.7.

It is evident from the foregoing observations and statistical data relating to typical employments with exposure to animal and mixed fiber dusts that the effects of such exposure are injurious to health, and particularly so in early life. The summary table shows that the mortality from consumption of employees in this group of occupations is from 50 to 100 per cent higher at all ages than would normally be expected.

GENERAL SUMMARY OF RESULTS.

A general summary of the preceding observations and statistical data does not seem necessary for the present purpose, which is to emphasize the degree of consumption frequency in different occupations rather than the differential degree of lung injury resulting from exposure to particular kinds of dust. In an address on "Tuberculosis as an industrial disease," read before the Sixth International Congress on Tuberculosis, by the writer, the latter aspect of the problem was enlarged upon to a certain extent. The discussion was limited, however, to industrial insurance mortality experience, at the same time including occupations exposing also to general organic and municipal or street dust, which it was not feasible to include in the pres-

ent discussion. From the address referred to the following extract is made:

When all the occupations for which the information is available, inclusive of many other than the thirty employments considered in this discussion, are combined, the proportionate mortality from consumption is 28.0 per cent of the mortality from all causes at ages 15 and over. In the group of occupations exposing chiefly to the inhalation of metallic dust the proportionate mortality from consumption was 37.4 per cent; in occupations exposing to animal and mixed fiber dust, 32.3 per cent; in occupations exposing to mineral dust, 28.6 per cent; in occupations exposing to municipal or street dust, 27.5 per cent; in occupations exposing to vegetable fiber dust, 27.4 per cent; and in occupations exposing to organic dust, 23.7 per cent. These percentages of consumption frequency are derived from an analysis of 22,987 deaths from all causes in the occupations included in the investigation.

The analysis may be extended to divisional periods of life, to emphasize the more immediate effects of health-injurious dust inhalation, and beginning with ages 15 to 24 the proportionate mortality from consumption was highest in occupations exposing to the inhalation of animal and mixed fiber dust, or 49.6 per cent of the mortality from all causes. In occupations exposing to metallic dust it was 47.1 per cent; to organic dust, 40.9 per cent; to municipal or street dust, 39.8 per cent; to vegetable fiber dust, 39.1 per cent; and to mineral dust, 31.7 per cent.

At ages 25 to 34 the proportionate mortality from consumption was highest in occupations exposing to the inhalation of metallic dust, or 56.7 per cent of the deaths from all causes. In occupations exposing to the inhalation of vegetable fiber dust it was 53.3 per cent; of organic dust, 50.1 per cent; of animal and mixed fiber dust, 49.7 per cent; of mineral dust, 47.6 per cent, and of municipal or street dust, 43.5 per cent.

At ages 35 to 44 the proportionate mortality from consumption was highest in occupations exposing to the inhalation of metallic dust, or 43.0 per cent of the deaths from all causes. In occupations exposing to the inhalation of animal and mixed fiber dust it was 40.4 per cent; of vegetable fiber dust, 39.8 per cent; of mineral dust, 36.3 per cent; of organic dust, 36.2 per cent, and of municipal or street dust, 34.6 per cent.

At ages 45 to 54 the proportionate mortality from consumption was highest in occupations exposing to the inhalation of mineral dust, or 27.9 per cent of the deaths from all causes. In occupations exposing to the inhalation of metallic dust it was 23.6 per cent; of animal and mixed fiber dust, 23.2 per cent; of vegetable fiber dust 22.9 per cent; of organic dust, 21.9 per cent, and of municipal or street dust, 14.2 per cent.

At ages 55 to 64 the proportionate mortality from consumption was highest in occupations exposing to the inhalation of mineral dust, or 16.2 per cent of the deaths from all causes. In occupations exposing to the inhalation of vegetable fiber dust it was 11.6 per cent; of metallic dust, 11.5 per cent; of organic dust, 11.4 per cent; of animal and mixed fiber dust, 11.2 per cent, and of municipal or street dust, 10.8 per cent.

At ages 65 and over the proportionate mortality from consumption was highest in occupations exposing to the inhalation of mineral dust, or 6.8 per cent of the deaths from all causes. In occupations exposing to the inhalation of organic dust it was 4.6 per cent; of metallic dust, 3.8 per cent; of animal and mixed fiber dust, 3.7 per cent; of vegetable fiber dust, 3.7 per cent, and of municipal or street dust, 2.9 per cent.

From the same address is quoted the following concluding portion summarizing the social and economic aspects of the tuberculosis problem in its relation to American industry:

The problem of occupation mortality and tuberculosis, with special reference to that period of life at which the degree of consumption frequency is most excessive, may now be briefly restated as follows: The census mortality rate of 1900 for men in gainful occupations was 15.0 per 1,000 and the consumption death rate 2.4 or 16.0 per cent of the mortality from all causes. Among men in manufacturing and mechanical industries the general death rate was 13.8 per 1,000, and the consumption death rate 2.6, or 18.8 per cent of the mortality from all causes. Among men in agricultural, transportation, and other outdoor occupations (including, however, a considerable proportion of persons of advanced years) the general death rate was 15.8 per 1,000, and the consumption death rate 1.5, or 9.5 per cent of the mortality from all causes. Contrasting the consumption death rates in these two groups of employments, the enormous waste of human life in industry becomes readily apparent. If the consumption mortality in dusty trades could be reduced to the corresponding proportion for men in outdoor occupations, a very large number of lives would be saved and continue for many years, which are now, to a large extent, needlessly wasted. The problem may be emphasized by a few specific illustrations of occupations exceptionally exposed to the risk of dust inhalation. The census mortality rate for marble and stone cutters was 14.9 per 1,000, and the consumption death rate 5.4, or 36.2 per cent of the mortality from all causes. The general death rate of cigar makers was 18.7 per 1,000, and the consumption death rate 4.8, or 27.7 per cent of the deaths from all causes. The general death rate of printers and compositors was 12.1, and the consumption death rate 4.4, or 36.4 per cent of the mortality from all causes, while for the strictly outdoor labor class, that is, farmers, planters, and farm laborers, the general death rate was 17.6 per 1,000, but the consumption death rate was only 1.1, or 6.25 per cent of the mortality from all causes. Granting that these rates are not entirely trustworthy, and that the census method of mortality investigation at that time was not as technically perfect as it is at present, and granting further that all occupation mortality data have their inherent defects, when derived from general methods of population enumeration and the methods in vogue in the registration of deaths, there is not the slightest reason to question the approximate accuracy of the foregoing rates and conclusions, which are in strict conformity to the other facts previously presented.

Estimating the wage-earning population (males and females) of the United States at ages 15 or over for 1908 at 31,768,943, and assuming a consumption death rate among this element of the population

of 2.2 per 1,000,(a) the number of deaths from consumption among wage-earners during 1908 would be approximately 69,892. Since it is possible by intelligent factory inspection and control, and with special regard to ventilation (that is, the removal of injurious dust particles at the point of their origin) to almost entirely eliminate the conditions injurious to health and life in factories and workshops and industry generally, it is not going too far to advance it as a fundamental principle of sanitary legislation that the consumption death rate among wage-earners can be reduced, by intelligent methods, to a ratio as low as 1.5 per 1,000.(b) On the above basis such a reduction would result in an annual saving of approximately 22,238 human lives. Since the average age at death of persons 15 years of age or over dying from consumption in the registration area of the United States is 37.4 years and probably not much more than 32 years for persons employed in strictly dusty trades, and since the normal average age at death in the mortality from all causes for persons 15 years of age or over is 52.8 years, there would be an average expected gain of at least 15.4 years of life for every death from consumption avoided by rational conditions of industrial life. Such a gain would represent a total of 342,465 years of additional lifetime, and by just so much the industrial efficiency of the American nation would be increased. If we place the economic value or net result of a year's lifetime at only $200, the total average economic gain to the nation would be $3,080 for every avoidable death of a wage-earner from consumption, representing the enormous total of $68,493,000 as the aggregate annual financial value in the probable saving in years of adult human life. With such results clearly within the range of practical attainment, nothing within reason should be left undone as a national,

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(a) This rate is based upon the number of gainfully employed persons (male and female) 10 years of age or over in the registration States in 1900 and the number of deaths among that element of the population during the census year. Unfortunately it has not been possible to calculate the corresponding consumption death rate for persons gainfully employed of ages 15 or over, as the necessary data were not included in the census reports. The consumption death rate of 2.2, however, would be raised rather than lowered if it were possible to get at the facts, because the consumption death rate is lower at ages 10 to 14 than at ages 15 or over. The calculations based upon the consumption death rate of 2.2 per 1,000 of the gainfully employed are therefore conservative, being in all probability rather an under than an over statement of the facts.

(b) See article on "Mortality from consumption in small cities," by Frederick S. Crum, in Quarterly Publications of the American Statistical Association for December, 1907, pp. 448–479. In this article, which is based on the mortality statistics of the United States census, it is shown that the average annual death rate from consumption in 209 small cities in the United States for the years 1901 to 1905 was 1.58 per 1,000, and in 30 of these cities the rate was below 1.0 per 1,000. If nine cities with over 15 per cent of Negro population are discarded it is shown that the consumption mortality for the remaining 200 small cities was 1.51 per 1,000.

state, and individual, or social duty to prevent that needless, but now enormous, loss of human life from consumption due to unfavorable conditions in American industry.

THE PROBLEM OF VENTILATION AND DUST REMOVAL IN INDUSTRY.

The statistical evidence presented in the preceding discussion of dusty trades is entirely conclusive that an excessive degree of consumption frequency in any particular occupation depends primarily or largely on the kind and quantity of dust inhaled by the workmen. All who have written upon the subject with authority emphasize the importance of adequate ventilation and dust reduction or removal by artificial means and methods, but the most conclusive evidence has been presented in two reports of an English departmental committee appointed to inquire into the ventilation of factories and workshops, the first being published in 1902, the second in 1907. The reports warrant the conclusion that effective ventilation of factories and workshops and the artificial removal of dust at the point of origin is entirely practicable and possible at moderate expense. Since these reports are not generally accessible, they are here quoted from at some length. The committee in its first report, in part, said as follows:

It is evident that the air breathed by the employees in a factory or workshop can be kept pure in two ways: (1) By constantly renewing from outside the whole of the air of the room in which work is carried on; (2) by removing impurities locally, or otherwise preventing them from ever mixing with the air breathed. The former process may be distinguished as general and the latter as local ventilation. As a general rule, dust and fumes can best be dealt with by local ventilation or by other means, whereas impurities due to the presence of employees and of lights burning must be got rid of by general ventilation.

The first report was limited to considerations of general ventilation, while the second considered at length the problem of local ventilation and other means of preventing injury to health by dust and fumes. The committee called attention to the agreement of authorities that health depends to a large extent on a constant and abundant supply of air which is uncontaminated by any substances which would cause discomfort or which contain poisonous, infective, or otherwise harmful material. By section 7 of the Factory and Warkshop Act, 1901, it was provided that "in every room in any factory or workshop sufficient means of ventilation shall be maintained," and, further, that "the secretary of state may, by special order, prescribe a standard of sufficient ventilation for any class of factories or workshops, and that standard shall be observed in all factories and workshops of that class." A large number of orders have been issued

under the provisions of this act, which unquestionably have resulted in a very material improvement in the conditions affecting health and industry.

Since the present discussion is limited to dusty trades, the observations and recommendations of the committee with reference to the purity of the atmosphere in factories and workshops otherwise than by the impairment of such purity through dust-generating processes as cause or effect inseparable from the conditions under which work is carried on, are passed over. One very suggestive paragraph from the report with reference to the practical difficulties confronting efforts at adequate ventilation in the case of sedentary occupations is quoted, but the objection on the part of employees to proper ventilation depends sometimes on the absence of proper warming arrangements during cold weather. The committee points out that—

This often leads to further vitiation of the air through the lighting of gas-burners for heating purposes during the day, a wasteful and objectionable plan. The establishment of a legal maximum limit of carbonic acid would probably conduce to the provision and use of proper heating appliances in such cases. We are of opinion that heating arrangements capable of maintaining in case of necessity a temperature at least 25° F. above that of the outside air, in the absence of lights and employees, but along with adequate ventilation, should be provided in all factories and workshops where the occupation is sedentary or involves little muscular exertion, and should be regularly used in the colder weather. In such occupations the temperature should not be less than about 60° F., particularly where the work involves delicate manipulations with the hands.

In the evidence appended to the first report the committee included the results of a scientific examination of the problem of ventilation in clothing factories, tailoring workshops, dressmaking and millinery workshops, boot and shoe workshops, laundries, cabinet and upholstery works, in establishments engaged in the making of bread, confectionery, and articles of food, letterpress printing, bookbinding, the manufacture of stationery and cardboard boxes, engineering and metal trades, file cutting, and the manufacture of the different varieties of textiles. The evidence collected was of a highly scientific and conclusive character, and the methods of inquiry employed are suggestive of the corresponding methods required for the proper determination of the circumstances injurious to health and life in all dusty trades.

In the second report the committee dealt with the application of fans to factory ventilation in connection, more particularly, with the removal of dust, steam, fumes, and other impurities associated with other manufacturing processes, and also with the very important question of the use of respirators by workmen engaged in occupations which can not be successfully subjected to artificial methods of ven-

tilation and dust removal. The committee discussed at considerable length the highly technical aspects of ventilating engineering, including the selection of fans and the relative utility of low and high pressure fans according to particular circumstances inseparable from the conditions under which given industries are carried on. It considered the volume of air required for different purposes of ventilation and the arrangement of inlets and outlets, fully illustrating its observations by a large number of charts and diagrams which clearly emphasized the strictly scientific manner in which the investigations of the committee were made to secure the practical solution of the problems which confronted them. From the remarks regarding general ventilation some of the more important and suggestive extracts are here quoted:

Certain impurities can hardly be prevented from becoming generally distributed in the air of a room, and can thus only be dealt with by general ventilation of the room. In most cases this is true of the products of respiration and of combustion of gas, the water evaporated in wet processes, and the heat given off from moving or artificially heated machinery, and in some cases of the production of dust. In removing these impurities, or sources of inconvenience, the supply of air must be sufficient for the particular purpose in view. If, for instance, heat or dust has to be removed, the ventilation must be sufficient to effect this removal, and not merely to dilute the products of respiration.

The quantity of air required to remove excessive heat and moisture can not well be calculated in the same way, as the loss of heat through walls and roof is usually not known, and in any case varies with the weather. The air supply must therefore be regulated with the help of thermometers. Air in which the reading by the wet-bulb thermometer exceeds about 70° begins to cause serious inconvenience with ordinary clothing, and this limit ought not to be exceeded in factories or workshops except under exceptional conditions.

Experiments show that if the wet-bulb reading rises beyond about 88° in fairly still air, the body temperature can no longer be prevented from rising seriously even in persons stripped to the waist and doing no work; and with muscular work under the same conditions the body temperature may rise rapidly at a wet-bulb temperature of 80°. With ordinary clothing this effect is considerably greater. At the upper limits it is not the temperature of the air, but that of the wet-bulb thermometer, that matters; and, provided that the air is so dry that the wet-bulb temperature does not exceed the limits specified, air temperatures up to 130° or more can be tolerated without rise of bodily temperature. Much higher wet-bulb temperatures can of course be borne for short periods, but the body temperature soon rises seriously.

In removing steam from rooms it must be borne in mind that cold air is apt to cause condensation of aqueous vapor. Thus if air saturated with moisture at 80° is mixed with even ten times its volume of air from outside at 40° condensation will nevertheless usually occur, and will always do so, whatever the dilution, if the incoming air is saturated with moisture at the outside temperature. If, however, the incoming air be warmed to a moderate extent as it enters,

this condensation will be prevented, and the ventilation will serve the double object of cooling the room and preventing condensation. If it is only necessary to prevent condensation of vapor and not to remove heat, the object can often be best attained by providing not extra ventilation, but heating arrangements. In the case of dye works, etc., where the building is often filled with steam from the vats, experience shows that the atmosphere is best cleared and condensation avoided by blowing in air heated by passing through a coil or other form of radiator.

As regards removal of dust, the standard of purity aimed at should always be sufficient to prevent injury to health, and should also be such as to prevent inconvenience and enable those employed to be clean when they leave work, after washing, if necessary. Dust from the disintegration of hard stone, steel grinding, etc., is extremely deleterious, and the same may be said of dust containing any poisonous constituent, such as lead. In such cases the dust should, by special means, apart from general ventilation, be entirely prevented from mixing with the general atmosphere of a room; and the same remark applies to all poisonous gases and fumes.

The effect of ventilation on the temperature of a working room during cold weather needs careful regulation. For sedentary work and fine manipulations a temperature of not less than about 60° is required. With lower temperatures the working powers of those present become impaired; and the effects of the low temperature are much increased by drafts. On the other hand, if the work implies active exertion, lower temperatures are permissible; and some kinds of work associated with dust, fumes, etc., can best be performed in sheds open to the air. In general, the more nearly open-air conditions can be attained in any class of work, the better; and, whenever possible, windows should be thrown widely open in summer weather.

Commenting upon the dust problem in particular and its relation to health, it is pointed out in a footnote to the report that it is sometimes difficult to say whether the inhalation of a given variety of dust is definitely injurious. The committee, therefore, held that—

Dust from any hard stone (such as flint, granite, sandstone, etc.) is undoubtedly very injurious to the lungs, producing a marked predisposition to phthisis. On the other hand, coal dust, cement dust, and probably many other varieties of organic and inorganic dust have by no means the same serious effects. During our inquiry many experiments have been made by Professor Ritchie with a view to finding a means of experimentally distinguishing the more injurious from less injurious dusts, but unfortunately no satisfactory results have as yet been reached.

In the discussion of the problem of local ventilation, the commitee came to the conclusion that—

Dust, fumes, steam, and other impurities unavoidably given off into the air should, wherever possible, be removed locally, and thus prevented from mixing with the general air of the room. Ventilation with this object in view may be distinguished as "local ventilation." Local ventilation is best carried on by means of exhaust fans, which

may be of the propeller type if large ducts and low velocities of air will suffice. In many cases, however, centrifugal fans are essential, and usually they are preferable on account of the liability of propeller fans to be interfered with by wind, etc. Fans used for the removal of corrosive fumes should be efficiently protected from their action. The question of possible injury to bearings or other parts by gritty material, and of possible blockage by fibrous material, should also be borne in mind in selecting a fan.

If dust or fumes are allowed to escape in any quantity into the general atmosphere of a room enormous volumes of air are required to remove or dilute them sufficiently. Great discomfort from cold or else great expense in heating are thus entailed, so that it is in every way preferable to remove them by local ventilation. The nearer to their points of production they can be removed the less will be the quantity of air required, and consequently the less will be the discomfort and expense which they cause.

Dusty machines which can not be completely boxed in should, if possible, be provided with an exhaust sufficiently powerful to draw the dust from exposed parts inward through the machine to an exhaust opening. Wheels used in dry grinding, polishing, etc., should, wherever possible, be inclosed and provided with an exhaust from a centrifugal fan capable of giving a current at high velocity around the exposed part of the wheel. The part of the wheel left open should be as small as is consistent with efficient working.

Dusty operations, such as the transference and packing of dry and dusty material, should, if possible, be carried out by mechanical arrangements boxed in so as to prevent the escape of dust, and combined, if necessary, with local exhaust ventilation. This is extremely important where the material contains some poisonous or harmful substance, such as lead, bichromate of potash, powdered flint, etc. Where such arrangements are not possible thoroughly efficient respirators should be used in the case of dangerous material.

For manipulations by hand in which dust, poisonous spray, or objectionable fumes are given off, working places provided each with a separate exhaust opening can often be arranged. The table at which the work is done should have an exhaust opening cut through it or placed behind it and so arranged that the dust arising from the work is drawn away from the mouth of the person working and into a duct placed beneath or behind the table. The provision of a hood, which may be made of glass, so as not to obstruct the light, greatly helps the action of the exhaust, which must be sufficient to actually prevent the dust from reaching the mouth of the worker. Where the dust requires to be collected a settling chamber under the exhaust opening can sometimes be provided.

Of the important and suggestive remarks of the committee regarding matters of technical detail in the installation of local ventilation, mention is made only of those regarding operations in wool sorting and rag sorting. In these occupations the committee thought the best way to manipulate the dusty material was on a flat-wire grating through which air is exhausted from below. It was held that in such a case the rate of flow at every part of the grating must be sufficient

to draw the dust downward, and that the whole arrangement, including inlet ventilation to the room, must be such that this purpose is effected under all conditions, for it was explained that—

It often occurs that a large dusty machine can not be sufficiently inclosed for the effective application of direct-exhaust ventilation, or that dusty work by hand can not be confined to the immediate neighborhood of an exhaust opening. In these cases air inlets and outlets should be so arranged as to carry off the dust in such a direction as to contaminate as little as possible the air in positions where persons have to be present. The most generally available plan is to have the exhaust openings in the floor around each dusty machine, or as close as possible to whatever the source of the dust may be, and to allow air to enter in an abundant stream from the roof above, warmed if necessary to prevent impact of cold draft on workers. As dust tends naturally to fall to the floor, it is best to remove it downward unless a rapid air current, sufficient to draw it in any direction, is available. If the machine is placed near a wall and no person is required to work between the wall and the machine, the dust may be advantageously exhausted through a fan placed low down in the wall and securely guarded.

In the case of machines which can not be boxed in it will often be found that the dust is produced at some particular point where it is capable of being locally removed. Thus, for illustration, the committee stated that if the dust is produced as the material is passed through rollers, as in the operation performed by a machine known as a spread board in flax spinning, exhaust ventilation applied close to each roller will remove it completely with a minimum of trouble and expense. In continuation of the discussion the committee pointed out that—

With regard to all exhaust openings for extraction of dust, etc., it must be clearly borne in mind that in whatever direction the opening may point the air feed is from all round; hence the radius within which a perceptible draft is produced toward the opening is extremely limited. The air current toward an exhaust opening can not be directed except by cumbrous air guides, whereas the current from an inlet can be directed just like the water issuing from a fireman's hose.

It is held that hitherto hardly any advantage has been taken of the latter fact in connection with the removal of dust and fumes, but the committee was confident that many difficult cases can be successfully dealt with by utilizing the momentum of air issuing from an inlet opening, and if compressed air in small tubes is available, fine jets of it directed across any source of dust and fumes toward a large outlet opening would be decidedly effective. It, therefore, suggested as a plan to test the efficiency of any arrangement for the local removal of dust or fumes the simple method of a piece of smoking brown paper or other material held at the place where the dust or fumes are given off.

In the case of dust which may not be discharged into the open air on account of the nuisance or damage which it would cause to the surrounding locality and which must, therefore, be separated from the discharged air, the "Cyclone separator" is often extremely effective, and this separator the committee describes by illustrations in the appendix. The invention requires little space and is easily erected at a point either near to or remote from the fan. It was stated, however, that—

The dust may also be separated in a settling chamber, taking the form of a room or an outhouse set apart for the purpose. In this case the addition of steam from a jet will often greatly facilitate the precipitation of light dust. Heavier metallic particles can be blown into a tank of water. A common defect in settling chambers is the neglect to provide a sufficient outlet for the spent air, by which means the whole arrangement for exhausting and settling the dust is rendered ineffective.

As it is evident that the circumstances under which fan ventilation needs to be applied vary greatly in different rooms and different processes of manufacture, we would, in conclusion, take this opportunity of pointing out the necessity of carefully considering the special conditions requiring to be dealt with in each individual case, and the desirability of obtaining competent skilled advice in all cases of doubt, or of employing, in the installation of fan ventilation, only such firms as are known to have at their disposal the requisite knowledge and experience.

Finally, in concluding its extremely valuable report, the committee considered the use of respirators, as follows:

The use of respirators capable of arresting dust is often recommended in connection with factory work as a substitute for efficient removal of dust. Experience has, however, shown that it is extremely difficult to enforce the use of respirators, as they are all more or less uncomfortable and inconvenient, besides being unsightly. It is also very difficult to keep respirators in working order and closely applied to the face. Often enough it is found that most of the air breathed by a person wearing a respirator leaks in between the face and the respirator, and is consequently unfiltered. This is particularly apt to happen after a respirator has been worn sufficiently long for the filtering material to become damp and clogged with moisture. Except, therefore, where dust is definitely dangerous and can not be dealt with by exhaustion, or by using wet processes, or in other ways, we are unable to recommend the use of respirators as an alternative to keeping the air clear of dust.

For the exceptional cases in which it is necessary for men to work in air containing poisonous or otherwise dangerous dust, the mouth and nose may be kept covered by a sheet of fresh cotton wool kept closely applied all round by suitable fastenings passing round the neck. This forms a reliable and efficient respirator, and is commonly used by men who have to perform such work as the removal of arsenic from arsenic flues, or of white lead from lead chambers.

For cases where work has to be done in an atmosphere containing poisonous gases or fumes, a smoke helmet, with air supplied from

outside through a pipe, may be used. The air supply should be not less than 2 cubic feet per minute and may be provided either from a bellows worked by hand or from a mechanically driven air pump or high-pressure centrifugal fan. A self-contained breathing apparatus, such as is used in mines, is less convenient for factory work and more expensive.

The importance and great practical value of preventive measures in efforts to reduce the health-injurious circumstances of different trades has made it seem advisable to make rather extended abstracts from the admirable and thoroughly scientific report of the committee on ventilation of factories and workshops. The conclusions and recommendations of the committee were, however, anticipated by Sir James Crichton-Browne, who, in his address on The Dust Problem, held that—

In dealing with industrial dust generally the one universal and potent remedy is, of course, ventilation. In contending with certain special kinds of dust special appliances and arrangements are necessary; but for dust, as a whole, our aim should be to intercept and remove it at its point of origin and to insure a bounteous supply of fresh air, and many contrivances for this purpose, more or less efficient, are already in use.

After referring to the then pending report of the departmental committee on the ventilation of factories and workshops, Sir Crichton-Browne summed up his own conclusions in the statement that—

What is wanted is a code of precise instructions to be placed in the hands of a manufacturer who is required to provide fans, indicating the number, pattern, size, speed, and position of the fans which will most effectively and economically secure the desired result, together with directions as to the number and position of openings into the outer air, and also a judgment on the physiological effects of existing respirators and proposals for the construction of one more convenient and trustworthy and less cumbrous than any yet known.

English opinion is decidedly in favor of a clear statement of the scientific principles that should underlie all methods of factory ventilation and dust removal, but so framed in clear and specific language for the guidance of inspectors that the legal requirements can be carried into effect with the least amount of interference with the industrial methods and conditions of the present day. Sir Crichton-Browne also expressed the hope that the report of the departmental committee would offer suggestions to architects for the construction of factories, since many, if not most of the factories now existing, are so built as to render almost impossible a proper system of ventilation, which should have been a primary consideration in their erection. He was confident in his prediction that rational factory legislation, with special reference to ventilation and dust removal,

would greatly tend to reduce the death rate among many different classes of operatives, improve their health, and augment their productive power. He quoted the evidence of factory inspectors and managers who had testified to the improvement in health and the increased vigor of the workers subsequent to the improved methods of ventilation. One leading manufacturer, replying to inquiries of the inspector of cotton-cloth factories, expressed the opinion that "the effect of improved ventilation on the health of the workers has been good. We have had less staying away through sickness than before we had artificial humidity and ventilation in our sheds. The earnings have been more regular, but we do not find that they have increased as much as we expected; but the effect of the change has been advantageous to the manufacturer, the quality of the work being better and more perfect."

Thus upon both humanitarian and economic grounds the effect of scientific ventilation of factories and workshops, and in particular the effective removal of industrial dust, combine to emphasize the need of more or less radical changes in the conditions as they exist at the present time.

The entire subject of the removal of dust and fumes in factories, with special reference to the health-injurious circumstances of dusty trades, has also been presented in an admirable summary account by J. S. Haldane, M. D., F. R. S., in one of the Shaw lectures on "Industrial hygiene," before the Royal Society of Arts, delivered February 28, 1908. Doctor Haldane was one of the most important members of the departmental committee on the ventilation of factories and workshops, and his views, in part, have already been included in the extended account of the report and recommendations of the committee. The following remarks restating his conclusions as to the causes responsible for more or less health-injurious conditions among factory workers and his recommendations as to the methods most likely to bring about a material improvement in those conditions are important and are quoted from his lecture:

Whether or not any variety of dust is known to cause dangerous effects when habitually inhaled, I think that every kind of dust produced in manufacturing process ought, as far as practicable, to be prevented or removed from the atmosphere in which the work people are present. The reason for this is not only that dusty air is, at the best, unpleasant to breathe, but that when dust is present the clothes, skin, and hair become dirty, untidy, and uncomfortable. This inevitably tends to lower the social status and self-respect of work people if, at any rate, they have to go back to their homes in the same untidy condition. Where dust and dirt can not be avoided the provision of overalls, or of means of washing and changing clothes on leaving work, is extremely desirable.

Of dusts which are definitely harmful, one very important class is that from the disintegration of hard stone or other material. As instances of this we may take the dust from siliceous or other hard stone, which has to be disintegrated in the mining of gold, tin, lead, and other metals, and the dressing of hard stone, or the ground flint dust used in pottery work, or the dust from dry grinding in the metal trades, or the steel dust produced in file cutting and other work.

In many cases the best way of dealing with dust is to prevent its formation altogether. This can be effected by substituting wet for dry processes, and, fortunately, much of the most dangerous dust can be dealt with in this way—in particular the dust from disintegration of hard stone or steel. Thus the use of a jet of water prevents dust formation in rock-drill and other work in tin and ganister mining, special rules to the effect being now in force. It is to be hoped that in all cases where dust from disintegration of hard stone, fire-clay bricks, and similar material is apt to be inhaled, wet methods will also be adopted where possible. The substitution of wet for dry grinding and for dressing of grindstones is another important step in the right direction, and I have little doubt that in many other dusty processes it would be practicable to use wet methods, though, unfortunately, wet processes are quite out of the question in very many cases.

When dust formation can not be avoided, its escape can sometimes be prevented by entirely boxing in the dusty process. Where the dust is itself the product of the process, as in the grinding or breaking up of material, efficient boxing in is an advantage to the process itself as well as to the persons employed in it.

In most cases it is unfortunately not possible to either prevent the formation of dust or to box in the dusty process completely, and the only method available is to draw the dust by means of an air current. There are certain general principles applicable to the removal of dust in this way. In the first place, the dust ought to be removed at, or as near as possible to, the point of origin. The advantages of this are evident, for by this means the dust is prevented from getting into the general atmosphere of the room and being inhaled by those present, as well as settling everywhere. A far smaller volume of air is also sufficient to remove the dust. This is important, not only from the point of view of expense, but because drafts and cold are also prevented. When dust is permitted to get into the general atmosphere of a factory, enormous volumes of air are required to carry it away, which means that equal volumes have to come in from outside, so that warming or prevention of drafts may be quite impracticable. As a good example of the advantage of removing dust locally I may instance a device for removing the dust produced by rollers in a process preparatory to flax-spinning. The dust produced at the rollers is sucked in by small exhaust openings applied close to the rollers. A quite small air current applied in this way is far more effective than one hundred times as great an air current a few feet off would be.

A second general principle is that the air current from the source of dust to the exhaust opening should, as far as possible, envelop the source of dust, and be of sufficient velocity to carry the dust with it in spite of the ordinary slight drafts existing in the room, or produced by the dusty machine. It is unfortunate that in whatever

direction an exhaust opening may point, the air entering it is sucked in from all sides. Hence the linear velocity of the draft toward the opening diminishes very rapidly with increasing distance, and at a distance of 2 or 3 feet an exhaust opening, unless very large, will fail to carry off dust efficiently, particularly from a machine which itself causes drafts.

The lecture by Doctor Haldane was fully illustrated to bring its more technical portion within the ready understanding of the layman, and the address should be consulted by all who desire to become thoroughly informed as to the most advanced and qualified opinion regarding the effective and practical removal of dust and fumes in factories and workshops. The remarks and conclusions are decidedly practical, and applicable to American establishments, in which thus far the problem of scientific ventilation and effective dust removal has been almost entirely neglected.

APPENDIX.

TABLE I.—NUMBER OF MALES EMPLOYED IN VARIOUS OCCUPATIONS IN THE UNITED STATES, 1900, BY AGE GROUPS.

[Computed from report of the Bureau of the Census on Occupations, 1900.]

Occupation.	Number of male employees in each age group.						
	15 years or over.	15 to 24 years.	25 to 34 years.	35 to 44 years.	45 to 54 years.	55 to 64 years.	65 years or over.
Tool and cutlery makers	26,997	7,258	8,335	5,811	3,261	1,666	666
Gold and silver workers	19,474	6,493	5,443	3,913	2,009	1,139	477
Brass workers	25,557	8,016	8,531	5,188	2,428	1,034	360
Printers, lithographers, and pressmen	136,923	50,669	44,191	24,210	10,993	5,059	1,801
Engravers	10,628	3,227	3,498	2,124	1,020	509	250
Total—Occupations with exposure to metallic dust	219,579	75,663	69,998	41,246	19,711	9,407	3,554
Marble and stone cutters	54,039	8,579	16,566	14,555	9,075	3,766	1,498
Glass workers	44,396	17,882	13,314	7,625	3,838	1,345	392
Potters	12,856	4,536	3,825	2,545	1,259	483	208
Plasterers	35,506	3,971	9,205	8,839	7,791	3,801	1,899
Paper hangers	21,607	5,486	7,077	4,689	2,821	1,122	412
Total—Occupations with exposure to mineral dust	168,404	40,454	49,987	38,253	24,784	10,517	4,409
Cotton-mill operatives	110,953	53,622	28,129	16,031	8,887	3,346	938
Hosiery and knitting mill operatives	11,372	6,350	2,699	1,355	607	250	111
Paper and pulp makers	26,485	8,747	8,445	5,154	2,764	1,042	333
Cabinetmakers	35,435	4,490	7,940	9,044	6,857	4,144	2,960
Total—Occupations with exposure to vegetable fiber dust	184,245	73,209	47,213	31,584	19,115	8,782	4,342
Hat and cap makers	14,948	4,110	4,655	3,415	1,702	768	298
Silk-mill operatives	20,301	9,022	5,301	3,380	1,563	785	250
Woolen-mill operatives	40,768	15,042	10,956	7,446	4,340	2,189	795
Carpet-factory operatives	10,034	3,180	2,654	1,842	1,182	691	485
Upholsterers	28,434	7,394	8,362	6,013	3,745	1,943	977
Total—Occupations with exposure to animal and mixed fiber dust	114,485	38,748	31,928	22,096	12,532	6,376	2,805
All occupied males—Continental United States	22,802,545	5,933,720	5,933,847	4,704,682	3,250,059	1,856,181	1,063,856

TABLE II.—PER CENT OF MALES EMPLOYED IN EACH AGE GROUP IN VARIOUS OCCUPATIONS IN THE UNITED STATES, 1900.

[Computed from report of the Bureau of the Census on Occupations, 1900.]

Occupation.	Per cent of male employees in each age group.						
	15 years or over.	15 to 24 years.	25 to 34 years.	35 to 44 years.	45 to 54 years.	55 to 64 years.	65 years or over.
Tool and cutlery makers	100.0	26.9	30.9	21.5	12.1	6.2	2.4
Gold and silver workers	100.0	33.3	28.0	20.1	10.3	5.8	2.5
Brass workers	100.0	31.4	33.4	20.3	9.5	4.0	1.4
Printers, lithographers, and pressmen	100.0	37.0	32.3	17.7	8.0	3.7	1.3
Engravers	100.0	30.4	32.9	20.0	9.6	4.8	2.3
Total—Occupations with exposure to metallic dust	100.0	34.4	31.9	18.8	9.0	4.3	1.6
Marble and stone cutters	100.0	15.9	30.6	26.9	16.8	7.0	2.8
Glass workers	100.0	40.3	30.0	17.2	8.6	3.0	0.9
Potters	100.0	35.3	29.7	19.8	9.8	3.8	1.6
Plasterers	100.0	11.2	25.9	24.9	21.9	10.7	5.4
Paper hangers	100.0	25.4	32.7	21.7	13.1	5.2	1.9
Total—Occupations with exposure to mineral dust	100.0	24.0	29.7	22.7	14.7	6.3	2.6
Cotton-mill operatives	100.0	48.3	25.4	14.5	8.0	3.0	0.8
Hosiery and knitting mill operatives	100.0	55.9	23.7	11.9	5.3	2.2	1.0
Paper and pulp makers	100.0	33.0	31.9	19.5	10.4	3.9	1.3
Cabinetmakers	100.0	12.7	22.4	25.5	19.3	11.7	8.4
Total—Occupations with exposure to vegetable fiber dust	100.0	39.7	25.6	17.1	10.4	4.8	2.4
Hat and cap makers	100.0	27.5	31.1	22.9	11.4	5.1	2.0
Silk-mill operatives	100.0	44.4	26.1	17.7	7.7	3.9	1.2
Woolen-mill operatives	100.0	36.9	26.9	18.3	10.6	5.4	1.9
Carpet-factory operatives	100.0	31.7	26.4	18.4	11.8	6.9	4.8
Upholsterers	100.0	26.0	29.4	21.2	13.2	6.8	3.4
Total—Occupations with exposure to animal and mixed fiber dust	100.0	33.8	27.9	19.3	10.9	5.6	2.5
All occupied males—Continental United States	100.0	26.0	26.3	20.6	14.3	8.1	4.7

TABLE III.—NUMBER OF DEATHS IN VARIOUS OCCUPATIONS IN THE REGISTRATION STATES OF THE UNITED STATES, 1900, BY AGE GROUPS.

[From report of the Bureau of the Census on Vital Statistics, 1900.]

Occupation.	Number of deaths due to—					
	All causes in each age group.				Consumption at ages 15 years or over.	Other respiratory diseases at ages 15 years or over.
	15 to 24 years.	25 to 44 years.	45 to 64 years.	65 years or over.		
Compositors, printers, and pressmen	94	333	142	89	237	84
Marble and stone cutters	13	143	155	81	142	53
Glass blowers and workers	17	48	29	13	35	10
Plasterers and whitewashers	9	51	54	32	39	25
Total—Occupations with exposure to mineral dust	39	242	238	126	216	88
Cabinetmakers and upholsterers	19	128	135	164	89	63
Hat and cap makers	17	92	74	45	53	33

TABLE IV.—DEATH RATE PER 1,000 IN VARIOUS OCCUPATIONS IN THE REGISTRATION STATES OF THE UNITED STATES, 1900, BY AGE GROUPS.

[From report of the Bureau of the Census on Vital Statistics, 1900.]

Occupation.	Death rate per 1,000 due to—					
	All causes in each age group.				Consumption at ages 15 years or over.	Other respiratory diseases at ages 15 years or over.
	15 to 24 years.	25 to 44 years.	45 to 64 years.	65 years or over.		
Compositors, printers, and pressmen	5.0	12.3	20.0	108.8	4.4	1.6
Marble and stone cutters	3.4	9.3	24.7	122.9	5.4	2.0
Glass blowers and workers	4.6	10.9	21.8	82.3	3.7	1.0
Plasterers and white washers	7.8	10.7	23.5	88.4	4.5	2.9
Total—Occupations with exposure to mineral dust	4.5	9.9	24.0	106.9	4.9	2.0
Cabinetmakers and upholsterers	4.6	10.5	19.8	109.6	3.6	2.6
Hat and cap makers	5.4	13.1	32.9	173.1	4.2	2.6
All occupied males—Registration States	5.1	8.8	19.9	98.4	2.4	2.0

TABLE V.—NUMBER OF DEATHS FROM ALL CAUSES, FROM CONSUMPTION, AND FROM OTHER RESPIRATORY DISEASES AMONG OCCUPIED MALES IN RHODE ISLAND, COMPARED, 1897 TO 1906.

[From reports of the Rhode Island state board of health.]

Occupation.	Number of deaths due to—				Per cent of deaths due to—		
	All causes.	Consumption.	Other respiratory diseases.	Consumption and other respiratory diseases.	Consumption.	Other respiratory diseases.	Consumption and other respiratory diseases.
Polishers	42	14	20	34	33.3	47.6	80.9
Tool makers	44	9	5	14	20.5	11.4	31.9
Jewelers	557	173	51	224	31.1	9.2	40.3
Brass workers	5	1	.....	1	20.0	.....	20.0
Printers	81	21	15	36	25.9	18.5	44.4
Compositors	12	3	2	5	25.0	16.7	41.7
Pressmen	5	.....	2	2	.....	40.0	40.0
Engravers	45	8	4	12	17.8	8.9	26.7
Total—Occupations with exposure to metallic dust	791	229	99	328	29.0	12.5	41.5
Stone cutters and marble workers	125	40	21	61	32.0	16.8	48.8
Plasterers	25	5	4	9	20.0	16.0	36.0
Paper hangers	14	3	3	6	21.4	21.4	42.8
Molders	157	31	25	56	19.7	15.9	35.6
Total—Occupations with exposure to mineral dust	321	79	53	132	24.6	16.5	41.1
Operatives	798	218	73	291	27.3	9.1	36.4
Spinners	71	18	5	23	25.4	7.0	32.4
Weavers	259	67	30	97	25.9	11.6	37.5
Knitters	8	5	.....	5	62.5	.....	62.5
Cabinetmakers	50	12	9	21	24.0	18.0	42.0
Wood turners and finishers	38	5	10	15	13.2	26.3	39.5
Total—Occupations with exposure to vegetable fiber dust	1,224	325	127	452	26.6	10.4	37.0
Wool sorters	37	5	5	10	13.5	13.5	27.0
Upholsterers	25	6	3	9	24.0	12.0	36.0
Total—Occupations with exposure to animal and mixed fiber dust	62	11	8	19	17.7	12.9	30.6
All occupied males—State of Rhode Island	19,314	3,429	2,420	5,849	17.8	12.5	30.3

TABLE VI.—YEARS OF LIFE LIVED BY OCCUPIED MALES IN CERTAIN OCCUPATIONS, IN ENGLAND AND WALES DURING THE YEARS 1900 TO 1902, BY AGE GROUPS.(a)

[From Part II, Supplement to the Sixty-fifth Annual Report of the Registrar-General of Births, Deaths and Marriages in England and Wales.]

Occupation.	Years of life lived by males in each age group during 1900 to 1902. (a)						
	15 to 19 years.	20 to 24 years.	25 to 34 years.	35 to 44 years.	45 to 54 years.	55 to 64 years.	65 years or over.
Tool and instrument makers	17,721	15,942	29,904	24,387	18,522	11,415	5,067
Brass workers	28,815	23,010	33,078	21,420	13,443	6,585	2,256
Printers	56,076	46,080	78,153	48,465	28,542	13,752	4,383
Total—Occupations with exposure to metallic dust	102,612	85,032	141,135	94,272	60,507	31,752	11,706
Glass workers	17,700	11,589	20,166	13,167	9,030	4,374	1,290
Potters	19,455	17,112	29,463	20,043	12,894	6,408	2,055
Paper hangers and whitewashers	19,704	21,786	29,490	27,162	20,181	10,236	3,921
Lithographers	5,163	4,848	8,898	6,066	3,510	1,848	693
Total—Occupations with exposure to mineral dust	62,022	55,335	88,017	66,438	45,615	22,866	7,959
Cotton manufacture	107,298	82,881	135,507	98,739	59,079	27,948	7,965
Hosiery-mill employees	4,989	3,825	8,541	8,049	6,150	4,329	3,807
Lace makers	6,201	4,461	8,790	8,358	4,281	2,703	1,359
Cordage makers	4,095	1,914	3,093	2,820	2,532	2,124	1,332
Paper makers	9,237	6,984	10,749	7,512	5,070	2,691	981
Cabinetmakers	54,741	46,614	72,924	55,869	39,957	22,842	10,194
Wood turners	15,975	13,008	22,161	19,254	15,774	10,806	4,428
Total—Occupations with exposure to vegetable fiber dust	202,536	159,687	261,765	200,601	132,843	73,443	30,066
Furriers	2,151	2,265	4,341	3,795	2,847	1,365	510
Hatters	6,561	6,627	12,981	9,006	6,306	3,225	1,257
Silk workers	4,350	2,751	5,829	5,373	3,798	3,249	2,994
Woolen and worsted mill employees	39,249	30,222	56,322	44,046	33,132	20,268	8,610
Carpet and rug makers	3,114	2,313	4,947	4,134	3,060	1,650	1,002
Total—Occupations with exposure to animal and mixed fiber dust	55,425	44,178	84,420	66,354	49,143	29,757	14,373

a The years of life as used in this table means three times the number of occupied males enumerated at the census of 1901.

TABLE VII.—MORTALITY DUE TO ALL CAUSES AMONG OCCUPIED MALES IN CERTAIN OCCUPATIONS IN ENGLAND AND WALES, 1900 TO 1902, BY AGE GROUPS.

[From Part II, Supplement to the Sixty-fifth Annual Report of the Registrar-General of Births, Deaths, and Marriages in England and Wales.]

Occupation.	Deaths due to all causes in each age group.						
	15 to 19 years.	20 to 24 years.	25 to 34 years.	35 to 44 years.	45 to 54 years.	55 to 64 years.	65 years or over.
Tool and instrument makers	37	53	189	333	481	480	510
Brass workers	64	118	194	274	281	241	189
Printers	179	278	595	494	507	423	384
Total—Occupations with exposure to metallic dust	280	449	888	1,101	1,269	1,144	1,083
Glass workers	57	59	136	173	218	183	154
Potters	51	63	155	291	408	347	243
Paper hangers and whitewashers	30	75	120	313	387	333	283
Lithographers	8	26	50	51	70	57	57
Total—Occupations with exposure to mineral dust	146	223	461	828	1,083	920	737
Cotton manufacture	288	358	742	949	1,209	1,150	1,014
Hosiery-mill employees	5	22	46	54	99	152	503
Lace makers	16	12	59	70	50	88	119
Cordage makers	9	11	20	21	33	69	141
Paper makers	32	28	54	50	56	71	93
Cabinetmakers	143	174	379	550	693	700	846
Wood turners	31	58	138	225	394	375	411
Total—Occupations with exposure to vegetable fiber dust	524	663	1,438	1,919	2,534	2,605	3,127
Furriers	8	10	37	49	57	70	55
Hatters	19	41	87	103	125	116	130
Silk workers	10	9	24	46	68	117	322
Woolen and worsted mill employees	86	152	292	392	568	752	1,110
Carpet and rug makers	9	12	29	39	56	56	117
Total—Occupations with exposure to animal and mixed fiber dust	132	224	469	629	874	1,111	1,734

TABLE VIII.—MORTALITY DUE TO CONSUMPTION AMONG OCCUPIED MALES IN CERTAIN OCCUPATIONS IN ENGLAND AND WALES, 1900 TO 1902, BY AGE GROUPS.

[From Part II, Supplement to the Sixty-fifth Annual Report of the Registrar-General of Births, Deaths, and Marriages in England and Wales.]

Occupation.	Deaths due to consumption in each age group.						
	15 to 19 years.	20 to 24 years.	25 to 34 years.	35 to 44 years.	45 to 54 years.	55 to 64 years.	65 years or over.
Tool and instrument makers	3	25	88	144	132	60	10
Brass workers	14	50	97	97	62	17	1
Printers	58	157	285	235	122	47	7
Total—Occupations with exposure to metallic dust	75	232	470	476	316	124	18
Glass workers	10	21	58	60	44	13	.....
Potters	12	23	59	76	92	28	2
Paper hangers and whitewashers	8	23	36	108	73	41	6
Lithographers	4	13	24	19	15	8	1
Total—Occupations with exposure to mineral dust	34	80	177	263	224	90	9
Cotton manufacture	88	137	273	285	216	77	17
Hosiery-mill employees	3	9	21	20	26	15	3
Lace makers	7	5	25	20	11	6	1
Cordage makers	1	4	8	7	3	8	2
Paper makers	5	9	21	16	9	5	1
Cabinetmakers	38	77	159	212	153	62	19
Wood turners	10	20	64	73	87	32	6
Total—Occupations with exposure to vegetable fiber dust	152	261	571	633	505	205	49
Furriers	.....	4	15	18	11	10	3
Hatters	4	23	48	37	30	7	.....
Silk workers	1	5	14	11	15	12	6
Woolen and worsted mill employees	27	72	102	99	94	46	16
Carpet and rug makers	2	6	7	13	9	4	1
Total—Occupations with exposure to animal and mixed fiber dust	34	110	186	178	159	79	26

TABLE IX.—MORTALITY DUE TO OTHER DISEASES OF THE RESPIRATORY SYSTEM AMONG OCCUPIED MALES IN CERTAIN OCCUPATIONS IN ENGLAND AND WALES, 1900 TO 1902, BY AGE GROUPS.

[From Part II, Supplement to the Sixty-fifth Annual Report of the Registrar-General of Births, Deaths, and Marriages in England and Wales.]

Occupation.	Deaths due to other respiratory diseases in each age group.						
	15 to 19 years.	20 to 24 years.	25 to 34 years.	35 to 44 years.	45 to 54 years.	55 to 64 years.	65 years or over.
Tool and instrument makers	4	9	34	49	100	119	129
Brass workers	7	12	20	44	53	62	43
Printers	20	17	43	60	62	71	91
Total—Occupations with exposure to metallic dust	31	38	97	153	215	252	263
Glass workers	5	7	20	32	52	47	37
Potters	9	10	19	66	139	148	72
Paper hangers and whitewashers	3	10	23	37	79	91	67
Lithographers	.....	1	7	6	6	8	19
Total—Occupations with exposure to mineral dust	17	28	69	141	276	294	195
Cotton manufacture	27	50	110	149	247	274	227
Hosiery-mill employees	1	1	6	6	18	26	103
Lace makers	.....	2	3	4	7	21	24
Cordage makers	.....	3	3	2	8	19	39
Paper makers	3	3	7	9	14	13	16
Cabinetmakers	17	20	47	72	118	166	183
Wood turners	5	8	16	51	68	93	110
Total—Occupations with exposure to vegetable fiber dust	53	87	192	293	480	612	702
Furriers	2	3	4	9	5	16	8
Hatters	.....	2	10	12	31	35	30
Silk workers	3	.....	.....	7	9	12	75
Woolen and worsted mill employees	12	7	42	64	102	131	219
Carpet and rug makers	1	1	5	4	7	15	29
Total—Occupations with exposure to animal and mixed fiber dust	18	13	61	96	154	209	361

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TABLE X.—DEATH RATE PER 1,000 DUE TO ALL CAUSES AMONG OCCUPIED MALES IN CERTAIN OCCUPATIONS IN ENGLAND AND WALES, 1900 TO 1902, BY AGE GROUPS.

[From Part II, Supplement to the Sixty-fifth Annual Report of the Registrar-General of Births, Deaths, and Marriages in England and Wales.]

Occupation.	Death rate per 1,000 due to all causes in each age group.						
	15 to 19 years.	20 to 24 years.	25 to 34 years.	35 to 44 years.	45 to 54 years.	55 to 64 years.	65 years or over.
Tool and instrument makers	2.09	3.32	6.32	13.65	25.97	42.05	100.65
Brass workers	2.22	5.13	5.86	12.79	20.90	36.60	83.78
Printers	3.19	6.03	6.46	10.19	17.76	30.76	87.61
Total—Occupations with exposure to metallic dust	2.73	5.28	6.29	11.68	20.97	36.03	92.52
Glass workers	3.22	5.09	6.74	13.14	24.14	41.84	119.38
Potters	2.62	3.68	5.26	14.52	31.64	54.15	118.25
Paper hangers and whitewashers	1.52	3.44	4.07	11.52	19.18	32.53	72.18
Lithographers	1.55	5.36	5.62	8.41	19.94	30.84	82.25
Total—Occupations with exposure to mineral dust	2.35	4.02	5.24	12.46	23.74	40.23	92.60
Cotton manufacture	2.68	4.32	5.48	9.61	20.46	41.15	127.31
Hosiery-mill employees	1.00	5.75	5.39	6.71	16.10	35.11	132.12
Lace makers	2.58	2.69	6.71	8.38	11.68	32.56	87.56
Cordage makers	2.20	5.75	6.47	7.45	13.03	32.49	105.86
Paper makers	3.46	4.01	5.02	6.66	11.05	26.38	94.80
Cabinetmakers	2.61	3.73	5.20	9.84	17.34	30.65	82.99
Wood turners	1.94	4.46	6.23	11.69	24.98	34.70	92.82
Total—Occupations with exposure to vegetable fiber dust	2.59	4.15	5.49	9.57	19.08	35.47	104.00
Furriers	3.72	4.42	8.52	12.91	20.02	51.28	107.84
Hatters	2.90	6.19	6.70	11.44	19.82	35.97	103.42
Silk workers	2.30	3.27	4.12	8.56	17.90	36.01	107.55
Woolen and worsted mill employees	2.19	5.03	5.18	8.90	17.14	37.10	128.92
Carpet and rug makers	2.39	5.19	5.86	9.43	18.30	33.94	116.77
Total—Occupations with exposure to animal and mixed fiber dust	2.38	5.07	5.56	9.48	17.78	37.33	120.64
All occupied males—England and Wales	2.44	4.41	6.01	10.22	17.73	31.01	88.39

TABLE XI.—DEATH RATE PER 1,000 DUE TO CONSUMPTION AMONG OCCUPIED MALES IN CERTAIN OCCUPATIONS IN ENGLAND AND WALES, 1900 TO 1902, BY AGE GROUPS.

[From Part II, Supplement to the Sixty-fifth Annual Report of the Registrar-General of Births, Deaths, and Marriages in England and Wales.]

Occupation.	Death rate per 1,000 due to consumption in each age group.						
	15 to 19 years.	20 to 24 years.	25 to 34 years.	35 to 44 years.	45 to 54 years.	55 to 64 years.	65 years or over.
Tool and instrument makers	0.17	1.57	2.94	5.90	7.13	5.26	1.97
Brass workers	.49	2.17	2.93	4.53	4.61	2.58	.44
Printers	1.03	3.41	3.65	4.85	4.27	3.42	1.60
Total—Occupations with exposure to metallic dust	.73	2.73	3.33	5.05	5.22	3.91	1.54
Glass workers	.56	1.81	2.88	4.56	4.87	2.97	.....
Potters	.62	1.34	2.00	3.79	7.14	4.37	.97
Paper hangers and whitewashers	.41	1.06	1.22	3.98	3.62	4.01	1.53
Lithographers	.77	2.68	2.70	3.13	4.27	4.33	1.44
Total—Occupations with exposure to mineral dust	.55	1.44	2.01	3.96	4.91	3.94	1.13
Cotton manufacture	.82	1.65	2.01	2.89	3.66	2.76	2.13
Hosiery-mill employees	.60	2.35	2.46	2.48	4.23	3.47	.79
Lace makers	1.13	1.12	2.84	2.39	2.57	2.22	.74
Cordage makers	.24	2.09	2.59	2.48	1.18	3.77	1.50
Paper makers	.54	1.29	1.95	2.13	1.78	1.86	1.02
Cabinetmakers	.69	1.65	2.18	3.79	3.83	2.71	1.86
Wood turners	.63	1.54	2.89	3.79	5.52	2.96	1.36
Total—Occupations with exposure to vegetable fiber dust	.75	1.63	2.18	3.16	3.80	2.79	1.63
Furriers	.....	1.77	3.46	4.74	3.86	7.33	5.88
Hatters	.61	3.47	3.70	4.11	4.76	2.17	.....
Silk workers	.23	1.82	2.40	2.05	3.95	3.69	2.00
Woolen and worsted mill employees	.69	2.38	1.81	2.25	2.84	2.27	1.86
Carpet and rug makers	.64	2.59	1.41	3.14	2.94	2.42	1.00
Total—Occupations with exposure to animal and mixed fiber dust	.61	2.49	2.20	2.68	3.24	2.65	1.81
All occupied males—England and Wales	.54	1.55	2.03	2.74	3.04	2.16	1.11

TABLE XII.—DEATH RATE PER 1,000 DUE TO OTHER DISEASES OF THE RESPIRATORY SYSTEM AMONG OCCUPIED MALES IN CERTAIN OCCUPATIONS IN ENGLAND AND WALES, 1900 TO 1902, BY AGE GROUPS.

[From Part II, Supplement to the Sixty-fifth Annual Report of the Registrar-General of Births, Deaths, and Marriages in England and Wales.]

Occupation.	Death rate per 1,000 due to other respiratory diseases in each age group.						
	15 to 19 years.	20 to 24 years.	25 to 34 years.	35 to 44 years.	45 to 54 years.	55 to 64 years.	65 years or over.
Tool and instrument makers	0.23	0.56	1.14	2.01	5.40	10.42	25.46
Brass workers	.24	.52	.60	2.05	3.94	9.42	19.06
Printers	.36	.37	.55	1.24	2.17	5.16	20.76
Total—Occupations with exposure to metallic dust	.30	.45	.69	1.62	3.55	7.94	22.46
Glass workers	.28	.60	.99	2.43	5.76	10.75	28.68
Potters	.46	.58	.64	3.29	10.78	23.10	35.04
Paper hangers and whitewashers	.15	.46	.78	1.36	3.91	8.89	17.09
Lithographers	.....	.21	.79	.99	1.71	4.33	27.42
Total—Occupations with exposure to mineral dust	.27	.50	78	2.12	6.05	12.86	24.50
Cotton manufacture	.25	.60	.81	1.51	4.18	9.80	28.50
Hosiery-mill employees	.20	.26	.70	.75	2.93	6.01	27.06
Lace makers	.....	.45	.34	.48	1.64	7.77	17.66
Cordage makers	.....	1.57	.97	.71	3.16	8.95	29.28
Paper makers	.32	.43	.65	1.20	2.76	4.83	16.31
Cabinetmakers	.31	.43	.64	1.29	2.95	7.27	17.95
Wood turners	.31	.62	.72	2.65	4.31	8.61	24.84
Total—Occupations with exposure to vegetable fiber dust	.26	.54	.73	1.46	3.61	8.33	23.35
Furriers	.93	1.32	.92	2.37	1.76	11.72	15.69
Hatters	.....	.30	.77	1.33	4.92	10.85	23.87
Silk workers	.69	.....	.....	1.30	2.37	3.69	25.05
Woolen and worsted mill employees	.31	.23	.75	1.45	3.08	6.46	25.44
Carpet and rug makers	.32	.43	1.01	.97	2.29	9.09	28.94
Total—Occupations with exposure to animal and mixed fiber dust	.32	.29	.72	1.45	3.13	7.02	25.12
All occupied males—England and Wales	.24	.48	.77	1.66	3.32	6.54	17.77

TABLE XIII.—DEATHS DUE TO ALL CAUSES AMONG OCCUPIED MALES IN CERTAIN OCCUPATIONS IN THE UNITED STATES, 1897 TO 1906, BY AGE GROUPS.

[From the experience of an industrial insurance company.]

Occupation.	Deaths due to all causes in each age group.						
	15 years or over.	15 to 24 years.	25 to 34 years.	35 to 44 years.	45 to 54 years.	55 to 64 years.	65 years or over.
Grinders	128	7	24	38	30	20	9
Polishers	279	48	75	68	48	19	21
Tool and instrument makers	303	40	59	68	56	32	48
Jewelers	403	60	74	50	59	77	83
Gold-leaf makers	25	2	8	4	3	2	6
Brass workers	414	66	112	91	58	54	33
Printers	1,590	344	439	346	211	142	108
Compositors	168	21	54	32	19	33	9
Engravers	192	31	47	42	34	19	19
Total—Occupations with exposure to metallic dust	3,502	619	892	739	518	398	336
Stone workers	858	21	114	172	232	199	120
Marble workers	200	3	30	40	46	50	31
Glass blowers	282	24	78	59	55	26	40
Glass cutters	116	26	30	27	20	8	5
Potters	384	46	68	84	78	72	36
Cement workers	88	10	12	19	15	19	13
Plasterers	577	25	78	107	127	121	119
Paper hangers	319	33	96	74	55	34	27
Foundrymen and molders	1,397	122	228	300	292	239	216
Core makers	162	66	42	25	9	9	11
Lithographers	160	37	45	29	21	18	10
Total—Occupations with exposure to mineral dust	4,543	413	821	936	950	795	628
Spinners	189	28	38	36	27	37	23
Weavers	915	108	174	155	144	137	197
Hosiery and knitting mill employees	65	23	22	7	9	3	1
Rope makers	109	12	18	17	18	24	20
Paper makers	115	13	28	18	15	23	18
Cabinetmakers	817	39	61	82	136	197	302
Wood turners	127	10	8	17	24	33	35
Wood carvers	123	11	20	23	31	21	17
Total—Occupations with exposure to vegetable fiber dust	2,460	244	369	355	404	475	613
Furriers and taxidermists	105	3	18	30	13	24	17
Hatters	832	78	175	185	127	135	132
Silk-mill employees	295	82	61	55	31	37	29
Woolen and worsted mill employees	106	20	16	14	19	24	13
Carpet and rug makers	155	17	22	17	24	34	41
Upholsterers	381	39	65	79	73	62	63
Mattress makers	41	9	7	11	5	8	1
Total—Occupations with exposure to animal and mixed fiber dust	1,915	248	364	391	292	324	296

TABLE XIV.—DEATHS DUE TO CONSUMPTION AMONG OCCUPIED MALES IN CERTAIN OCCUPATIONS IN THE UNITED STATES, 1897 TO 1906, BY AGE GROUPS.

[From the experience of an industrial insurance company.]

Occupation.	Deaths due to consumption in each age group.						
	15 years or over.	15 to 24 years.	25 to 34 years.	35 to 44 years.	45 to 54 years.	55 to 64 years.	65 years or over.
Grinders	63	4	17	24	12	5	1
Polishers	108	22	42	29	11	4	.....
Tool and instrument makers	101	13	35	24	21	4	4
Jewelers	113	24	44	22	13	7	3
Gold-leaf makers	7	1	4	2	.....	.....	.....
Brass workers	161	39	56	41	14	11	.....
Printers	613	167	247	140	42	13	4
Compositors	59	6	36	12	3	1	1
Engravers	67	12	29	19	5	2	.....
Total—Occupations with exposure to metallic dust	1,292	288	510	313	121	47	13
Stone workers	302	10	60	82	91	52	7
Marble workers	56	.....	15	16	16	7	2
Glass blowers	85	11	44	15	11	1	3
Glass cutters	40	7	14	11	5	1	2
Potters	127	11	36	37	22	14	7
Cement workers	17	1	3	4	6	3	.....
Plasterers	136	7	35	38	35	16	5
Paper hangers	107	14	47	33	8	4	1
Foundrymen and molders	311	29	92	82	65	27	16
Core makers	48	20	17	9	1	1	.....
Lithographers	70	21	28	13	5	3	.....
Total—Occupations with exposure to mineral dust	1,299	131	391	340	265	129	43
Spinners	56	13	19	16	7	1	.....
Weavers	254	43	93	59	37	15	7
Hosiery and knitting mill employees	24	5	15	2	2	.....	.....
Rope makers	28	6	9	7	6	.....	.....
Paper makers	34	6	15	7	2	3	1
Cabinetmakers	162	14	34	40	31	29	14
Wood turners	25	7	5	3	4	5	1
Wood carvers	27	3	9	9	5	1	.....
Total—Occupations with exposure to vegetable fiber dust	610	97	199	143	94	54	23
Furriers and taxidermists	34	1	7	19	4	2	1
Hatters	278	42	97	84	34	20	1
Silk-mill employees	106	28	32	33	7	4	2
Woolen and worsted mill employees	26	7	7	5	4	3	.....
Carpet and rug makers	37	9	10	6	5	4	3
Upholsterers	118	15	38	38	18	3	6
Mattress makers	16	4	3	4	2	3	.....
Total—Occupations with exposure to animal and mixed fiber dust	615	106	194	189	74	39	13

TABLE XV.—PER CENT OF DEATHS DUE TO CONSUMPTION AMONG OCCUPIED MALES IN CERTAIN OCCUPATIONS, 1897 TO 1906, BY AGE GROUPS.

[From the experience of an industrial insurance company.]

Occupation.	Per cent of deaths due to consumption in each age group.						
	15 years or over.	15 to 24 years.	25 to 34 years.	35 to 44 years.	45 to 54 years.	55 to 64 years.	65 years or over.
Grinders	49.2	57.1	70.8	63.2	40.0	25.0	11.1
Polishers	38.7	45.8	56.0	42.6	22.9	21.1	.....
Tool and instrument makers	33.3	32.5	59.3	35.3	37.5	12.5	8.3
Jewelers	28.0	40.0	59.5	44.0	22.0	9.1	3.6
Gold-leaf makers	28.0	50.0	50.0	50.0	.....	.....	.....
Brass workers	38.9	59.1	50.0	45.1	24.1	20.4	.....
Printers	38.6	48.6	56.3	40.5	19.9	9.2	3.7
Compositors	35.1	28.6	66.7	37.5	15.8	3.0	11.1
Engravers	34.9	38.7	61.7	45.2	14.7	10.5	.....
Total—Occupations with exposure to metallic dust	36.9	46.5	57.2	42.4	23.4	11.8	3.9
Stone workers	35.2	47.6	52.6	47.7	39.2	26.1	5.8
Marble workers	28.0	.....	50.0	40.0	34.8	14.0	6.5
Glass blowers	30.1	45.8	56.4	25.4	20.0	3.8	7.5
Glass cutters	34.5	26.9	46.7	40.7	25.0	12.5	40.0
Potters	33.1	23.9	52.9	44.0	28.2	19.4	19.4
Cement workers	19.3	10.0	25.0	21.1	40.0	15.8	.....
Plasterers	23.6	28.0	44.9	35.5	27.6	13.2	4.2
Paper hangers	33.5	42.4	49.0	44.6	14.5	11.8	3.7
Foundrymen and molders	22.3	23.8	40.4	27.3	22.3	11.3	7.4
Core makers	29.6	30.3	40.5	36.0	11.1	11.1	.....
Lithographers	43.8	56.8	62.2	44.8	23.8	16.7	.....
Total—Occupations with exposure to mineral dust	28.6	31.7	47.6	36.3	27.9	16.2	6.8
Spinners	29.6	46.4	50.0	44.4	25.9	2.7	.....
Weavers	27.8	39.8	53.4	38.1	25.7	10.9	3.6
Hosiery and knitting mill employees	36.9	21.7	68.2	28.6	22.2	.....	.....
Rope makers	25.7	50.0	50.0	41.2	33.3	.....	.....
Paper makers	29.6	46.2	53.6	38.9	13.3	13.0	5.6
Cabinetmakers	19.8	35.9	55.7	48.8	22.8	14.7	4.6
Wood turners	19.7	70.0	62.5	17.6	16.7	15.2	2.9
Wood carvers	22.0	27.3	45.0	39.1	16.1	4.8	.....
Total—Occupations with exposure to vegetable fiber dust	24.8	39.8	53.9	40.3	23.3	11.4	3.8
Furriers and taxidermists	32.4	33.3	38.9	63.3	30.8	8.3	5.9
Hatters	33.4	53.8	55.4	45.4	26.7	14.8	0.8
Silkmill employees	35.9	34.1	52.5	60.0	22.6	10.8	6.9
Woolen and worsted mill employees	24.5	35.0	43.8	35.7	21.1	12.5	.....
Carpet and rug makers	23.9	52.9	45.5	35.3	20.8	11.8	7.3
Upholsterers	31.0	38.5	58.5	48.1	24.7	4.8	9.5
Mattress makers	39.0	44.4	42.9	36.4	40.0	37.5	.....
Total—Occupations with exposure to animal and mixed fiber dust	32.1	42.7	53.3	48.3	25.3	12.0	4.4

TABLE XVI.—NUMBER AND PER CENT OF DEATHS DUE TO OTHER DISEASES OF THE RESPIRATORY SYSTEM AMONG OCCUPIED MALES IN CERTAIN OCCUPATIONS, 1897 TO 1906.

[From the experience of an industrial insurance company.]

Occupation.	Deaths due to respiratory diseases other than consumption.									
	Number due to—					Per cent of deaths from all causes.				
	All respiratory diseases.	Asthma.	Bronchitis.	Pneumonia.	Other respiratory diseases.	All respiratory diseases.	Asthma.	Bronchitis.	Pneumonia.	Other respiratory diseases.
Grinders	22	3	2	15	2	17.2	2.3	1.6	11.7	1.6
Polishers	35	2	3	25	5	12.6	.7	1.1	9.0	1.8
Tool and instrument makers	39	4	5	25	5	12.9	1.3	1.7	8.2	1.7
Jewelers	49	2	8	37	2	12.2	.5	2.0	9.2	.5
Gold leaf makers	5	.....	.....	3	2	20.0	.....	.....	12.0	8.0
Brass workers	51	2	1	36	12	12.3	.5	.2	8.7	2.9
Printers	221	9	19	169	24	13.9	.6	1.2	10.6	1.5
Compositors	25	1	.....	19	5	14.9	.6	.....	11.3	3.0
Engravers	22	1	.....	18	3	11.5	.5	.....	9.4	1.6
Total — Occupations with exposure to metallic dust	469	24	38	347	60	13.4	.7	1.1	9.9	1.7
Stone workers	162	13	30	95	24	18.9	1.5	3.5	11.1	2.8
Marble workers	36	3	4	26	3	18.0	1.5	2.0	13.0	1.5
Glass blowers	26	1	2	17	6	9.2	.4	.7	6.0	2.1
Glass cutters	15	1	.....	12	2	12.9	.9	.....	10.3	1.7
Potters	57	18	12	21	6	14.9	4.7	3.1	5.5	1.6
Cement workers	8	1	1	5	1	9.0	1.1	1.1	5.7	1.1
Plasterers	93	5	14	67	7	16.1	.9	2.4	11.6	1.2
Paper hangers	38	.....	3	30	5	11.9	.....	.9	9.4	1.6
Foundrymen and molders	277	14	21	211	31	19.8	1.0	1.5	15.1	2.2
Core makers	28	.....	1	24	3	17.3	.....	.6	14.8	1.9
Lithographers	22	.....	3	18	1	13.8	.....	1.9	11.3	.6
Total — Occupations with exposure to mineral dust	762	56	91	526	89	16.8	1.2	2.0	11.6	2.0
Spinners	28	4	2	17	5	14.8	2.1	1.1	9.0	2.6
Weavers	119	10	18	78	13	13.0	1.1	2.0	8.5	1.4
Hosiery and knitting mill employees	3	.....	.....	1	2	4.6	.....	.....	1.5	3.1
Rope makers	9	1	2	6	.....	8.2	.9	1.8	5.5	.....
Paper makers	10	.....	1	9	.....	8.7	.....	.9	7.8	.....
Cabinetmakers	120	14	14	75	17	14.7	1.7	1.7	9.2	2.1
Wood turners	21	3	2	11	5	16.5	2.4	1.6	8.6	3.9
Wood carvers	16	2	2	9	3	13.0	1.6	1.6	7.3	2.5
Total — Occupations with exposure to vegetable fiber dust	326	34	41	206	45	13.3	1.4	1.7	8.4	1.8
Furriers and taxidermists	17	.....	5	9	3	16.2	.....	4.8	8.6	2.8
Hatters	97	4	12	71	10	11.7	.5	1.5	8.5	1.2
Silk-mill employees	33	2	3	21	7	11.2	.7	1.0	7.1	2.4
Woolen and worsted mill employees	17	5	2	8	2	16.0	4.7	1.9	7.5	1.9
Carpet and rug makers	26	3	3	16	4	16.7	1.9	1.9	10.3	2.6
Upholsterers	46	3	2	33	8	12.1	.8	.5	8.7	2.1
Mattress makers	6	.....	.....	6	.....	14.6	.....	.....	14.6	.....
Total — Occupations with exposure to animal and mixed fiber dust	242	17	27	164	34	12.7	.9	1.4	8.6	1.8

TABLE XVII.—DEATHS DUE TO ALL CAUSES, TO CONSUMPTION, AND TO OTHER RESPIRATORY DISEASES AMONG MALES IN THE REGISTRATION AREA OF THE UNITED STATES, 1900 TO 1906, BY AGE GROUPS.

[From reports of the Bureau of the Census on Mortality.]

Age at death.	Deaths due to all causes.	Deaths due to consumption.		Deaths due to other respiratory diseases.	
		Number.	Per cent of deaths due to all causes.	Number.	Per cent of deaths due to all causes.
15 to 24 years	134,700	37,495	27.8	13,010	9.7
25 to 34 years	186,530	58,424	31.3	20,298	10.9
35 to 44 years	205,930	48,500	23.6	25,655	12.5
45 to 54 years	205,497	30,781	15.0	25,869	12.6
55 to 64 years	218,151	17,707	8.1	26,575	12.2
65 years or over	435,228	11,949	2.7	50,603	11.6
Total	1,386,036	204,856	14.8	162,010	11.7

LIST OF REFERENCES ON OCCUPATION MORTALITY.

Abraham and Davies: The Law Relating to Factories and Workshops. London, 1908.

Acturial Society of America: Specialized Mortality Investigation. Experience of 24 companies with 98 classes of risks. New York, 1903.

Adler, M. N.: Occupation Mortality. Article in Journal of the Institute of Actuaries, Vol. XII, p. 273. London, 1866.

Andrae, Albert: Die Sterblichkeit in den land- und forstwirthschaftlichen Berufen nach den Erfahrungen der Gothaer Lebensversicherungs-Bank a. Gotha. (The Mortality in Agriculture and Forestry from the experience of the Gotha Life Insurance Society). Berlin, 1906.

Arlidge, J. T., M. D.: Lectures on Mineral (nonmetallic) Dusts and the Making of Pottery. Transactions Sanitary Institute, Vol. XIV, p. 102. 1893.

Arlidge, J. T., M. D.: Hygiene of Textile Manufactures, Silk, Cotton, Woolen, and Linen Industries. Transactions Sanitary Institute, p. 137. 1893.

Arlidge, J. T., M. D.: Hygiene, Diseases, and Mortality of Occupations. Percival & Co., London, 1892.

Ayrton, W. E., Prof.: Improvements Science can Effect in our Trades, and in the Condition of our Workmen. In Scientific American Supplement, No. 211, January 17, 1880.

Babbage, Charles: On the General Principles which Regulate the Application of Machinery to Manufacture and the Mechanical Arts. Article in Encyclopedia Metropolitana, Vol. VIII. London, 1849.

Baines, Edward: History of the Cotton Manufacture (Chapter XVI), on Condition of the Working Classes, with Observations upon Health and Rate of Mortality, p. 433. London, 1835.

Ballard, Doctor: On Effluvium Nuisances Arising in Connection with Various Manufacturing and other Branches of Industry. In Report of the Medical Officer of the Local Government Board for 1876, p. 111. London, 1878.

Ballard, Doctor: Second Report on Effluvium Nuisances, etc. In Annual Report of the Medical Officer of the Local Government Board for 1877, p. 84. London, 1878.

Ballard, Doctor: Third Report on Effluvium Nuisances, etc. In Annual Report of the Medical Officer of the Local Government Board for 1878, p. 42. London, 1879.

Barlow, Peter: Elementary Principles of Practical Mechanics and Engineering, with illustrations of mechanical and manufacturing processes. Article in Encyclopedia Metropolitana, Vol. VIII. London, 1849.

Barnes, A. E.: Pathology of Grinders' Phthisis. British Medical Journal, p. 483, August 22, 1908.

Barrand, Arthur R.: On the Mortality Experienced by Assured Lives Engaged in Hazardous or Unhealthful Occupations. Fourth International Actuarial Congress. Paris, 1900.

Beard, Geo. M., A. M., M. D.: Our Home Physician; A Guide, etc. Article on Influence of Occupation on Health and Longevity, p. 332. New York, 1869.

Bell, John H., M. D.: Anthrax. Article in Oliver's Dangerous Trades, p. 634. London, 1902.

Bennett, W. H., M. D.: Article on Dust as an Exciting Cause of Disease of the Air Passages. New York Medical Record, 1872.

Bertillon, Jacques, M. D.: Décès par Professions, par Groupes, et par Sexe. (Mortality by Occupation According to Age, Sex, and Causes.) Annual Statistics of the City of Paris, 1893–1899.

Bertillon, Jacques, M. D.: chief of the department of municipal statistics of the city of Paris: Morbidity and Mortality According to Occupation. Translation from the French for the Journal of the Royal Statistical Society, p. 559. London, December, 1892.

Bertillon, Jacques, M. D.: Classification of Occupations. Publications of the American Statistical Association, Vol. III, p. 379. Boston, 1893.

Bevan, G. Phillips: The Industrial Classes and Industrial Statistics. 2 vols. London, 1876.

Bleaching Works, Report on Conditions in. Parliamentary report. London, 1855.

Blum, Agnes, Dr. med.: Article on Hygienische Fürsorge für Arbeiterinnen und deren Kinder (Hygienic Aspects of Employment of Women and Children in Industries). In Handbuch der Hygiene, Vol. VIII, p. 85. Edited by Theodor Weyl. Jena, 1897.

Blyth, A. W.: Article on Dust, p. 192, and on Occupations in Relation to Consumption, p. 444. Dictionary of Hygiene and Public Health, London, 1877.

Boulnois, Mrs. H. P.: Article on Hygienic Aspects of Occupations Suitable for Women. In Transactions of the Sanitary Institute, Vol. XXI, p. 165. London, 1901.

Boobbyer, Philip, M. D.: Address on Dust as a Factor in the Production of Disease. Read before the Royal Sanitary Institute. London, England. No date.

Boobbyer, Philip, M. D.: Special Report on Health of Lace Dressing Operatives. In Annual Report of Board of Health, Nottingham, England, 1906.

Bristowe, John Syer, M. D.: Industrial Diseases. Address read before the International Health Congress, Conference on Sanitary Subjects, p. 99. London, 1884.

Bristowe, John Syer, M. D.: Occupations which have to do with Phosphorus. In Annual Report of the Medical Officer of the Privy Council, p. 162. London, 1863.

Bristowe, John Syer, M. D.: Report on the Rag Trade and Its Influence in Spreading Infections of Disease. In Eighth Annual Report of the Medical Officer of the Privy Council, p. 196. London, 1866.

Brockbank, E. M.: Life Insurance and General Practice. Article on Occupational Mortality, p. 123; Occupational Paralysis, p. 260. London, 1908.

Bronzing and Lithographic Processes in Relation to Health. First Report on Dangerous Trades, Parliamentary Paper 8149, p. 11. London, 1896.

Buchanan, Doctor: On the Distribution of Phthisis as Affected by Dampness of Soil. In Tenth Annual Report of the Medical Officer of the Privy Council, p. 57. London, 1868.

Buchanan, Doctor: On the Health of Destitute Operatives in the Cotton Towns of Lancashire and Cheshire. In Fifth Annual Report of the Medical Officer of the Privy Council, p. 299. London, 1863.

Buffers and Polishers: Liability to Dust Inhalation. Article in Report of the New York State Factory Inspector, p. 52. Albany, 1893.

Burton, William: The Hygiene of the Pottery Trade. In Shaw Lectures on Industrial Hygiene, p. 25. London, 1908.

Campbell, C. T.: Sick Rates and Death Rates. Article in Popular Science Monthly, February, 1885, p. 527. New York.

Cancer Mortality in the United States, by Occupation. In Vol. II, Vital Statistics of the Tenth Census, p. 576. Washington, 1886.

Canfield: Relation of Dusty Occupations to Pulmonary Phthisis. Baltimore, 1889.

Census of 1890: Deaths of Males in Certain Occupations, in Certain Cities, and from Certain Causes of Death. Vol. VII, Part II, of Report on Vital Statistics, Table 18, p. 1130. Washington, 1896.

Census of 1900: Occupations in Relation to Deaths. Part I, Section XIII, Report on Vital Statistics, p. cclvii, also tables, p. 76. Washington, 1902.

Chadwick, Edwin, M. D.: Supplementary Report on the Practice of Interment in Towns. Article on Occupation Mortality and Average Age at Death of Workmen, p. 239. London, 1843.

Chadwick, Edwin, M. D.: The Health of Nations. Vol. I, Article on Life as a Commercial Problem, p. 41; Vol. II, Article on Comparative Vitality in Different Classes of the Community, p. 76, and Summary, p. 150. London, 1887.

Claims of Labor (anon.). An essay on the Duties of the Employers. Second edition, to which is added, An Essay on the Means of Improving the Health and Increasing the Comfort of the Laboring Classes. London, 1845.

Cochrane, Chas. H.: Modern Industrial Progress. Philadelphia, 1904.

Connecticut Mutual Life Insurance Company, Mortality Experience, 1846–1878, p. 54. Hartford, Conn., 1884.

Conrad, Dr. Joh.: Beitrag zur untersuchung des Einflusses von Lebensstellung und Beruf auf die Mortalitätsverhältnisse, auf Grund les statistichen Materials zu Halle a. S, von 1855–74 (Effect of Occupation on Health). Jena, 1877.

Cotton Cloth Factories Committee Report; Minutes of Evidence; Parliamentary Returns, C. 8349. London, 1897.

Cotton Manufacture. Report on Safeguards for the Prevention of Accidents. H. S. Richmond, Parliamentary Report, Cd. 3168. London, 1906.

Cotton Manufacture. Report on the Prevention of Accidents from Machinery. Parliamentary Paper, C. 9456. London, 1899.

Cotton Manufacture, United States Census, 1880, Vol. II, p. 945.

Cowgill, J. E.: Article on Occupation as Affecting the Death Rate. Medical Examiner and Practitioner. New York, July, 1901.

Cowgill, J. E.: Mortality of the United States; Diagrams of the Mortality by Occupation. Indianapolis, 1901.

Crum, Frederick S.: The Health and Mortality of the Cotton Mill Operatives of Blackburn, England. New York Medical Record, August 11, 1906.

Crum, Frederick S.: The Mortality from Consumption in Small Cities. Quarterly Publications American Statistical Association. Boston, December, 1907.

Crum, Frederick S.: Occupation Mortality Statistics of Sheffield, England, 1890–1907. Quarterly Publications American Statistical Association. Boston, December, 1908.

Dangerous Occupations. Article in Bulletin of the Massachusetts Bureau of Labor, No. 42, p. 305. Boston, 1906.

Dangerous Occupations. Special Report of Massachusetts State Board of Health. Published in Thirty-eighth Annual Report for 1906. Boston, 1907.

Dangerous Trades. Reports of Departmental Committee, 1896–1899. Parliamentary Paper, first report, C. 8149 (1896); second, C. 8522 (1897); third, C. 9073 (1898); final report, C. 9509 (1899).

Dangerous Trades. The Historical, Social, and Legal Aspects of Industrial Occupations as affecting Health, by a number of experts, edited by Thomas Oliver, M. D. London, 1902.

Davalos, J. N., M. D., and Jacobson, J., M. D.: Tuberculosis and the Industry of Tobacco in Cuba. Abstract of address before International Congress on Tuberculosis, Washington, D. C., 1908.

Deformities of Occupation, by M. Gabriel Prevost; contributed to La Science pour Tous. Reported in part in the Literary Digest (date unknown).

Degeneracy or Occupation Stress. Editorial in Journal American Medical Association, July 22, 1899.

Diseases and Disease Tendencies of Industries. Twenty-eighth Annual Report of the Bureau of Statistics of Labor and Industry of New Jersey, 1905, p. 175; Twenty-ninth Annual Report, p. 209. Trenton, 1906.

Dobson, Sir Benjamin: Humidity in Cotton Spinning. London, 1897.

Dock, George, M. D.: Influence of Overwork and Mental Strain in Tuberculosis. Abstract from address before International Congress on Tuberculosis, Washington, D. C., 1908.

Doehring, C. F. W., Ph. D.: Factory Sanitation and Labor Protection. Article in Bulletin of the Department of Labor. Washington, January, 1903.

Drake, Daniel, M. D.: The Principal Diseases of the Interior Valley of North America, Article on Cotton Ginning. Vol. II, pp. 799–801.

Duffy, Frank, secretary of Carpenters' Union of America: Consumption. Abstract of address before International Congress on Tuberculosis. Washington, D. C., 1908.

Dust; a Neglected Factor in Ill Health, by Robert Hessler, M. D. Transactions Indiana State Medical Society, 1904.

Dust and its Relation to Disease. Circular of Iowa State Board of Health; in report for 1903–1906, p. 105.

Dust Consumption. Report of Departmental Committee on Industrial Diseases, p. 213. London, 1907.

Dust Destructors, Report on, by the Medical Officer and the Engineer, London County Council. London, 1893.

Dust Diseases and Their Prevention. Article in New York Medical Record, p. 47, July 14, 1894.

Dust Diseases. Scientific American, volume 88, p. 90, Feb. 7, 1903.

Dusty Occupations and the Dust Problem. Second Annual Report New York State Factory Inspector, p. 68. Albany, 1888.

Elliot, E. B.: Life Tables of Massachusetts. Sixteenth Annual Report of Registration of Births, Marriages, and Deaths. Boston, 1858.

Factories and Workshops, Annual Reports of Chief of. Presented to both Houses of Parliament. London, 1895–1907.

Factory and Workshop Orders. London, 1908.

Fame and Glory of England Vindicated; An Answer to "The Glory and Shame of England" (anon.). Article on The Factory System of Britain, p. 50. New York, 1842.

Farr, William, M. D.: Vital Statistics, p. 392. London, 1885.

Farr, William, M. D.: Supplement to the Twenty-fifth Report of the Registrar-General of England and Wales. Article on Mortality of Persons in Different Occupations, p. xxxv; and tables, pp. 439–554. London, 1864.

File Cutting in Relation to Health. Third Report on Dangerous Trades. Parliamentary Paper, C. 9073, London, 1898, p. 6; also final report, Parliamentary Paper, C. 9420, London, 1899, pp, 14 and 25.

Fisher, Prof. Irving: Mortality Statistics of the United States Census. Publications of the American Economic Association, New York, 1899, p. 121.

Fisher, Prof. Irving: Economic Loss from Tuberculosis in the United States. Abstract of address before International Congress on Tuberculosis, Washington, D. C., 1908.

Flax Mills, Report upon, by Commander Hamilton P. Smith, R. N., H. M., Superintending Inspector of Factories. London, 1904.

Foster, Clement Le Neve, and Haldane, J. S.: The Investigation of Mine Air. London, 1905.

French, John Marshall, M. D.: Article on Occupation in Relation to Longevity. Medical Examiner and Practitioner, New York, January, 1904.

Fuller, Dr. M.; Meissner, C.; and Saeger, O.: Hygiene der Berg-, Tunnel- und Hüttenarbeiter (Hygiene of Mining and Metallurgy). In Handbuch der Hygiene, Vol. VIII, p. 225, edited by Theodor Weyl. Jena, 1897.

Gaertner, Frederick, M. D., Pittsburg, Pa.: Address on the Differentiation of Black Pigment found in the Liver, Spleen, and Kidneys from Coal Dust or other Foreign Deposits. New York Medical Record, Aug. 10, 1907.

Garvin, L. F. C.: Article on Injurious Effect of Cotton Factories upon Health. In Transactions of the American Public Health Association, Vol. III, p. 69. New York, 1877.

Gaskell, P.: Artisans and Machinery; the Moral and Physical Condition of the Manufacturing Population, Considered with Reference to Mechanical Substitutes for Human Labor (Chapter VIII, Health and Rate of Mortality; Chapter IX, Peculiar Diseases due to Factory Labor). London, 1836.

Glass Industry and its Relation to Health. Twelfth Annual Report of New Jersey Bureau of Labor, p. 29. Trenton, 1889.

Glass Polishing in Relation to Health. Third Report on Dangerous Trades, Parliamentary Paper, C. 9073, p. 46. London, 1898.

Gordon, Ogilvie (Mrs.): Handbook of Employments. Aberdeen, 1908.

Gould, Geo. M.: Borderland Studies. Volume II, p. 133. Philadelphia, 1908.

Government Factories and Workshops Committee. Parliamentary Paper, Cd. 3626. London, 1907.

Gradenwitz, Alfred, M. D.: Cause of Vitiation of Confined Air. Scientific American Supplement No. 1656, September 28, 1907.

Graham, George, Registrar-General of Births, Marriages, and Deaths for England and Wales, Fourteenth Annual Report, London, 1855. Article on Mortality of Persons in Different Occupations, pp. xv–xxiii.

Graham, George: Fifth Annual Report of the Registrar-General. Article on Occupation and Mortality, p. 41. London, 1843.

Greene, Charles Lyman: Medical Examination for Life Insurance. Article on Occupation, p. 147, Philadelphia, 1900; second edition, p. 156, Philadelphia, 1905.

Greenhow, Doctor: First Report on Districts with Excessive Mortality from Lung Diseases, in Third Annual Report of the Medical Officer of the Privy Council, London, 1861, p. 102; article on Manufacture of Pottery, p. 102; Cutlery and Other Metal Ware Manufactures, p. 113; Tin and Copper

Mining, p. 126; Flax Manufacture, p. 145; Silk Manufacture, p. 152; Wool Manufacture, p. 160; Hosiery Manufacture, p. 168; Cotton Manufacture, p. 172; Lace Making, p. 176; Straw Plaiting, p. 183; Glove Making, p. 187; Agricultural Districts, p. 190.

Greenhow, Doctor: Second Report on Districts with Excessive Mortality from Lung Diseases, in Fourth Annual Report of the Medical Officer of the Privy Council, London, 1862, p. 138; article on Button and various Metal Manufactures, p. 138; Grinders, p. 142; Button Making, p. 143; Brass Founders, p. 144; Pin Pointers, p. 146; Jewelers, p. 147; Ventilation of Workshops, p. 149; Iron and Coal Mining, p. 150; Iron and Steel Manufacture, p. 152; Enameling process, p. 153; Edge-Tool Manufacture, p. 153; Iron and Coal Mining, p. 154; Silk Manufacture, p. 167; Watchmaking, p. 172; Cotton Manufacture, p. 173; Lace Manufacture, p. 178; Hosiery Manufacture, p. 181; Lace Manufacture, p. 183; Warehouses, p. 185; Mortality of Women and Children, Manufacturing District, p. 187.

Greenwood, Alfred, M. D.: Annual Report upon the Health of Blackburn, England, 1907. Article on Economic Value of a Reduced Death Rate, p. 314; Cotton Operatives' Mortality Statistics, p. 222. Blackburn, 1908.

Grindstone Manufacture and Use. Third Report on Dangerous Trades, Parliamentary Paper, C. 9073, p. 68. London, 1898.

Gulick, Luther, M. D.: Article on When to Quit Working. In The Labor World. No date.

Guy, William A., M. D.: Occupations that Have to do with Emerald Green. In Fifth Report of the Medical Officer of the Privy Council, p. 126. London, 1863.

Guy, William A., M. D.: Article on Influence of Employment Upon Health. In First Report of the Health of Towns Commission, Vol. I, p. 89. London, 1844.

Haldane, J. S., M. D.: The Removal of Dust and Fumes in Factories. In Shaw Lectures on Industrial Hygiene, p. 41. London, 1908.

Halfort, A. C. L., M. D.: Entstehung, Verlauf und Behandlung der Krankheiten der Künstler und Gewerbetreibenden (The Causes, Courses, and Treatment of the Diseases of Artisans and Industrial Workers). Berlin, 1845.

Hamer, W. H., M. D.: Anthrax. Article in Oliver's Dangerous Trades, p. 621. London, 1902.

Hamilton, Alice: Industrial Diseases; with Special Reference to the Trades in which Women are Employed. Article in Charities and Commons. New York, September 5, 1908.

Hard, William: Article, Where Poison Haunts Man's Daily Work. Munsey's Magazine, September, 1907.

Harrington, Chas., M. D.: Practical Hygiene. Article on Occupation Diseases, p. 661; Dusty Trades, p. 674; Offensive Trades, p. 681. Philadelphia, 1905.

Hat Industry and its Relation to Health. Twelfth Annual Report of the New Jersey Bureau of Labor Statistics, p. 35. Trenton, 1889.

Hatters, Vital Statistics of. Published in the Semiannual Reports of the United Hatters of North America.

Hayes, Denis A.: Length of the Trade Life in the Glass Bottle Industry. Address at conference on labor conditions, in Proceedings of American Academy of Political and Social Science, p. 34. Philadelphia, May, 1906.

Hayward, T. E., M. D.: On the Construction of Life Tables and on their Application to a Comparison of the Mortality from Phthisis in England and Wales during the Decennia 1881–1890 and 1891–1900.

Hazen, Ed., A. M.: Popular Technology; or, Professions and Trades. In 2 vols. New York, 1843.

Health of Operatives who are Exposed to Certain Kinds of Dust, by Dr. G. Merkel. Translated for the Medical Record, 1874, p. 273.

Health of Towns Commission. First Report, Vol. I. Article on Influence of Employment upon Health, p. 89; Different Rates of Mortality Prevalent among Classes of Persons Engaged in Manufactories, p. 267, etc. London, 1844.

Health of Towns Commission. Second Report, Vol. I. Article on Consumption, etc., Effect Produced by Constantly Living in an Impure Atmosphere, pp. 4 and 116. London, 1845.

Health of Towns Commission. Second Report, Vol. II. Article on the Atmosphere of Mines, p. 1; Ventilation, p. 33; Supply of Air Required by Different Individuals, p. 64; Mechanical Impurities of the Atmosphere, p. 66; Excess of Mortality in Occupations, p. 238. London, 1845.

Health and Duration of Trade Life in Different Occupations. Special Investigation of the Bureau of Labor of New Jersey; Twelfth Report (1889), p. 1; Thirteenth Report (1890), p. 357; Fourteenth Report (1891), p. 171; Fifteenth Report (1892), p. 347; Seventeenth Report (1894), p. 81; Eighteenth Report (1895), p. 65.

Health and its Relation to Occupation. Tenth Annual Report, Ohio Bureau of Labor Statistics, 1886, p. 206.

Health and Morals in their Relation to Occupation. First Annual Report, Bureau of Labor of New York, p. 85. 1885.

Health and Safety of Persons Employed in Mines. Parliamentary Report. London, 1864.

Health in Industries. First Annual Report of the Bureau of Labor of Montana, p. 18. Helena, 1893.

Health in Industry: Tanning in its Relation to Health. Article in Twenty-ninth Annual Report of the New Jersey Bureau of Labor, p. 209. Trenton, 1906.

Health in Industry. Third Biennial Report of the Wisconsin Bureau of Statistics, p. 189. 1887–88.

Health in Various Industries and Causes of Decline. Sixth Annual Report of the New Jersey Bureau of Labor, p. 80. Trenton, 1883.

Health of Employees in Various Industries. Fifth Biennial Report, Bureau of Labor of California, p. 245. Sacramento, 1891–92.

Hirt, Dr. Ludwig: Die Krankheiten der Arbeiter (Diseases of Workingmen). Vol. I, Part I, Die Staubinhalations-Krankheiten (Occupations with Exposure to Dust), Breslau, 1871; Vol. I, Part II, Die in Folge der Einathmung von Gasen und Dämpfen enstandenen Krankheiten (Occupations with Exposure to Gas and Steam), Breslau, 1873; Vol. I, Part III, Die in Folge der Beschäftigung mit giftigen Stoffen enstandenen Krankheiten (Occupations with Exposure to Industrial Poisons), Leipzig, 1875.

Hirt, Dr. Ludwig: Vol. II, Die äusseren (chirurgischen) Krankheiten der Arbeiter (Occupation Liability to Industrial Accidents and Other Bodily Injuries). Leipzig, 1878.

Hirt, Dr. L., and Merkel, Dr. G.: Die Gewerbekrankheiten (Industrial Diseases). In Handbuch der Hygiene und Gewerbekrankheiten von Pettenkofer und Ziemssen. Gasinhalations-Krankheiten und die gewerblichen Vergiftungen von Prof. Dr. L. Hirt in Breslau; Die Staubinhalations-Krankheiten von G. Merkel in Nürnberg. Leipzig, 1882.

Hoffman, Frederick L.: Dust as a Factor in Occupation Mortality. Medical Examiner and Practitioner, December, 1907, p. 360. New York.

Hoffman, Frederick L.: Letter on the Scope and Method of the Eleventh Census; Reference to Occupation Statistics, etc. Published by the American Economic Association, New York, p. 502. 1899.

Hoffman, Frederick L.: Occupation Mortality Statistics of England and Wales, 1900–1902. In the Spectator, October 22, 1908. New York.

Hoffman, Frederick L.: Physical and Medical Aspects of Child Labor. Medical Examiner and Practitioner, August, 1903. New York.

Hoffman, Frederick L.: Physical and Medical Aspects of Labor and Industry; including statistical table of Occupational Mortality and Estimates of Economic Value of Industrial Labor and Life. In Annals of American Academy of Political and Social Science. Philadelphia, 1906.

Hoffman, Frederick L.: Statistical Laws of Tuberculosis. Address before Maryland Tuberculosis Society. Maryland Medical Journal, February, 1904. Baltimore.

Hoffman, Frederick L.: Problems of Social Statistics and Social Research. Address before the American Statistical Association. Quarterly Publications of the American Statistical Association, June, 1908, pp. 105–132. Boston, 1908.

Hoffman, Frederick L.: The General Death Rate of American Cities. Reference to relation of occupation to health and proportion of wage-earners to the general death rate. Quarterly Publications of the American Statistical Association, March, 1906, p. 22. Boston, 1906.

Hoffman, Frederick L.: The Relation of Occupation to Tuberculosis. Medical Examiner and Practitioner, September, 1907, p. 265. New York.

Hoffman, Frederick L.: Tuberculosis as an Industrial Disease. Abstract of address before the International Congress on Tuberculosis, Washington, D. C., 1908.

Hoffman, Frederick L.: Vital Statistics of the Census of 1900. Quarterly Publications of the American Statistical Association, Boston, 1902. Articles on Mortality from Accidents and Injuries, p. 169; Occupations and Mortality and Problems of Industrial Hygiene, p. 170; Misleading Occupation Death Rates, p. 172; Changes in Occupation Mortality, 1890–1900, p. 174, etc.

Holland, G. C., M. D.: The Vital Statistics of Sheffield. Article on Mortality in Cutlery Manufacture, pp. 152–205. London, 1843.

Homan, George, M. D., of St. Louis: Article on the Danger of Dust as a Cause of Tuberculosis. Journal American Medical Association, March 23, 1907, p. 1013. Chicago.

Huber: Article on Occupation and Tuberculosis. In Journal of American Medical Association, February 4, 1905. Chicago.

Hunter, Arthur: Mortality Among Insured Lives Engaged in Certain Occupations Involving Additional Hazard. Address before the Actuarial Society of America, 1907. New York, 1907.

Hunter, Henry Julian, M. D.: Report on Housing of the Poorer Parts of the Population. In Eighth Annual Report of the Medical Officer of the Privy Council, p. 50. London, 1866.

Hunter, Henry Julian, M. D.: In Seventh Annual Report of the Medical Officer of the Privy Council. Article on House Accommodation had by Rural Laborers in the Different Parts of England, p. 126. London, 1865.

Hunter, Robert: A Plea for the Investigation of Labor Conditions Affecting the Length of Trade Life. In Proceedings of American Academy of Political and Social Science, p. 38, May, 1906. Philadelphia.

Hutchinson, Woods, M. D.: Health of Employees as an Investment. Saturday Evening Post, Philadelphia, August 24, 1907.

Improvement of Labor Conditions in the United States. Proceedings American Academy of Political and Social Science, Philadelphia, May, 1906.

Industrial Diseases, Report of Departmental Committee on Compensation for. Parliamentary Papers, C. 3495. London, 1907.

Industrial Hygiene, Shaw Lectures before the Royal Society of Arts. London, 1908.

Influence of Occupation on Nervous Disorders. Article in New York Medical Journal, December 14, 1907.

International Conference on Labor. Parliamentary return, dated Home Office, August 3, 1905, being the resolutions of the Berlin Labor Conference concerning agreements as to work in mines, child labor, female labor, etc.

International Congress (Seventh) of Hygiene and Demography, Vol. VIII, Division II. Article on Mortality in Relation to Occupation, by William Ogle, M. D., p. 12; article, De la Morbidité et de la Mortalité par Professions, by Docteur Jacques Bertillon, p. 23; article on Factory Labor in the Indian Spinning and Weaving Mills, p. 232. London, 1892.

Ireland, George H.: The Preventable Causes of Diseases, Injury, and Death in American Manufactories and Workshops, and the Best Means and Appliances for Preventing and Avoiding Them. Lomb prize essay, American Public Health Association, Concord, N. H., 1886.

James, J. H.: An Enquiry as to the Duration of Life in Rural Districts. Second edition. London, 1858.

Johnston, C., and Bennett, S. R.: Dust Removal in Grinding Trades. British Medical Journal, August 22, 1908, p. 481.

Kay, Joseph, M. A.: The Social Condition and Education of the People of England. American edition. New York, 1863.

King, William A.: Article on Mortality Statistics of the Census in Relation to Occupation. American Journal of Sociology, September, 1897.

Knight, Charles: Cyclopedia of Industry of all Nations. London, 1851.

Kober, Geo. M.: Industrial Hygiene. Bulletin of United States Bureau of Labor, p. 472. 1908.

Körösy, Dr. Josef von: Einfluss der Confession, des Wohlstandes und der Beschäftigung auf die Todesursachen (Effect of Confession, Prosperity, and Occupation on Mortality). Berlin, 1898.

Kraft, Max: Article on Die Lüftung der Werkstätten (Workshop Ventilation), in Handbuch der Hygiene, Vol. VIII, p. 179, edited by Theodor Weyl. Jena, 1897.

Latham, John, M. D: Mortality from Phthisis in England and Wales; and on the Loss of Life from this Disease in the Various Occupations. Abstract of address before International Congress on Tuberculosis, Washington, D. C., 1908.

Laurent, H.: Report on the Mortality in Various Occupations; with diagrams by Doctor Bertillon. Third International Actuarial Congress. Paris, 1900.

Lead Smelters, Diseases of. Local Government Medical Report, 1878, p. 278.

Lester, C. Edwards: The Glory and Shame of England, Vol. I, p. 283; reference, Worsted Mills. London, 1841.

Letheby, H., M. D.: Report on the Workshop Regulation Act, 1867. London, 1868.

Letheby, H., M. D.: The Noxious and Offensive Trades and Manufactures, with Especial Reference to the Best Practicable Means of Abating the Several Nuisances Therefrom. London, 1875.

Lewis, Waller, M. D., medical officer to the general post-office: Report on the Laws and Ordonnances in Force in France for the Regulation of Noxious Trades and Occupations. London, 1855.

Lithographers, Diseases of. Sixth Report of the Medical Officer of the Privy Council, p. 409. London, 1864.

Lloyd, James Hendrie: Article on Diseases of Occupations. In 20th Century Practice of Medicine, Vol. III, p. 311. William Wood & Co., New York, 1895.

Longstaff, Geo. B.: Studies in Statistics. Article on Occupation Classification, p. 210. London, 1891.

Lucifer Matches, Report on Manufacture of; by Thorpe, Oliver, and Cunningham. Parliamentary Paper, C. 9188. London, 1899.

Mapother, Edward Dillon, M. D.: Article on Prevention of Artisans' Diseases. Lectures on Public Health, p. 132, Royal Dublin Society, 1874.

Marshall, Alfred: Principles of Economics. Article on Influence of Occupation on Health, p. 277. London, 1898.

McKay, George A.: Deputy Inspector of Factories. Address on The Effect upon the Health, Morals, and Mentality of Working People Employed in Overcrowded Workshops. Fifth Annual Report of the New York State Factory Inspector, p. 77. Albany, 1891.

McLauchlan, James J., F. F. A.: On the Mortality in Certain Hazardous or Unhealthy Occupations as Shown by the Official Statistics. Read before the Institute of Actuaries, London, December 8, 1898.

McMahon, James, Prof.: Method of Estimating Present Value of the Net Prospective Earnings Lost by Death from Tuberculosis in New York State in One Year. Twenty-eighth Annual Report of the State Department of Health, p. 255. Albany, 1908.

McNeill, George E.: Dangerous Trades and Occupations. Insurance Press, New York, July 26, 1905.

Merkel, Gottlieb, M. D.: Diseases Caused by the Inhalation of Dust. Translated by Dr. Horatio Bridge, of New York City; in New York Medical Record, 1874, p. 442.

Mettler, L. Harrison, M. D.: Occupation Neuroses. Abstract reported in New York Medical Record, December 10, 1904.

Miller, James Alexander, M. D.: Tuberculosis among Printers. Abstract from address before International Congress on Tuberculosis, Washington, D. C., 1908.

Mills, Charles K., M. D.: Lecture on Mental Overwork and Premature Disease among Public and Professional Men. Published in Smithsonian Miscellaneous Collections. No. 594. Washington, 1885.

Moser, Ludwig: Die Gesetze der Lebensdauer. Ueber die Sterblichkeit in verschiedenen Ständen; über den Einfluss der Krankheiten; die Sterblichkeit in Gefängnissen, etc. (The Laws of Longevity. Articles on Mortality in various classes; on the Influence of disease; on Mortality in prisons, etc.), p. 152. Berlin, 1839.

Mutual Life Insurance Company of New York Mortality Experience, Vol. II. Article on Occupations, p. 42. New York, 1877.

Neison, F. G. P.: Contributions to Vital Statistics. Second Edition. Duration of life in various classes, pp. 13–62. London, 1846.

Neison, F. G. P.: Contributions to Vital Statistics; with an inquiry into the relation of occupation and locality to life and health. Third edition. London, 1857.

Neison, F. G. P.: The Influence of Occupation upon Health. Article in the Journal of the Institute of Actuaries, Vol. XVII, pp. 95–126. London, 1873.

Netolitzky, Dr. A.: Hygiene der Textilindustrie (Hygiene of the Textile Industry). In Handbuch der Hygiene, Vol. VIII, p. 1001, edited by Theodor Weyl. Jena, 1897.

Nevin, John, M. D.: Occupational Diseases. Article in Medical Examiner and Practitioner, p. 254. New York, August, 1908.

Newsholme, Arthur, M. D.: The Elements of Vital Statistics. Third edition, p. 169. Swan Sonnenschein & Co., London, 1899.

Newsholme, Arthur, M. D.: Occupation and Mortality. Lectures on Sanitation of Industries and Occupations. Transactions Sanitary Institute, Vol. XIV, p. 81. London, 1893.

Newsholme, Arthur, M. D.: Poverty and Disease (with special reference to Phthisis in Ireland). Address before the Epidemiological Section of the Royal Society of Medicine, London, October 25, 1907.

Newsholme, Arthur, M. D.: The Prevention of Tuberculosis. Article on Occupations, pp. 157 and 327. Dutton & Co., New York, 1908.

Niven, James, M. D.: Infection by Phthisis in Workshops in Manchester. Appendix to address read before the British Congress on Tuberculosis. Transactions, Vol. II, p. 60. London, 1902.

Noble, Daniel, M. D.: Facts and Observations relative to the Influence of Manufactures upon Health and Life. London, 1843.

Occupational Diseases, appointment of State commission in Illinois to investigate. Referred to in Journal of American Medical Association, January 18, 1908.

Occupation Mortality Statistics. Connecticut Registration Reports, 1881–1907. Hartford, various dates.

Occupation Mortality Statistics. Massachusetts Registration Reports, 1843–1889. Boston, various dates.

Occupation Mortality Statistics. New Jersey State Board of Health, Annual Reports, 1903–1907. Trenton, N. J., 1904–1908.

Occupation Mortality Statistics. Reports of the State Boards of Registration and Health of Vermont. Registration Reports, 1857–1889, and Health Reports, 1900–1906. Montpelier, various dates.

Occupation Mortality Statistics. Rhode Island Registration Reports, 1853–1906. Providence, various dates.

Occupations, Safe and Perilous. Article in Scientific American Supplement, December 10, 1892.

Occupations, Special Report of the Bureau of the Census on. Washington, 1904.

Oesterlen, Fr., Dr.: Handbuch der medicinischen Statistik. Sterblichkeit, Lebensdauer bei verschiedenen Beschäftigungen oder Professionen und Ständen (Handbook of Medical Statistics. Article on Occupational Mortality), p. 202. Tubingen, 1874.

Ogle, William, M. D.: Supplement to the Forty-fifth Annual Report of the Registrar-General of England and Wales. Article on Mortality of Males Engaged in Different Occupations, p. xxi; Influence of Dust, p. lviii; Mean Annual Death Rate, p. cxvii.

Oliver, Thomas, M. D.: China and Earthenware Manufacture, Potters' Rot. Article in Dangerous Trades, p. 382. London, 1902.

Oliver, Thomas, M. D.: Diseases of Occupation. Dutton & Co., New York, 1908.

Oliver, Thomas, M. D.: Dust as a Cause of Occupation Disease (with illustrations of micro-photography). Article in Dangerous Trades, p. 267. London, 1902.

Oliver, Thomas, M. D.: Dust Women. Article in Dangerous Trades, 278. London, 1902.

Oliver, Thomas: The Etiology and Prevention of Pneumonokoniosis. British Medical Journal, p. 481, August 22, 1908.

Oliver, Thomas, M. D.: Lucifer Match Making. In Shaw Lectures on Industrial Hygiene, p. 5. London, 1908.

Oliver, Thomas, M. D.: Metallic Poisons. Transactions Sanitary Institute, Vol. XIV, p. 154. London, 1893.

Oliver, Thomas, M. D.: Miscellaneous Occupations. Article on Upholsterers, p. 789; Joiners and Carpenters, p. 790; Workers in Sequoia Wood, p. 790; Glass Manufacture—Glass Blowing, p. 804; Manufacture and Use of Emery Wheels, p. 813; in Dangerous Trades. London, 1902.

Oliver, Thomas, M. D.: Physiology and Pathology of Work and Fatigue. Article in Dangerous Trades, p. 104. London, 1902.

One Hundred Years of American Commerce (1795–1895). 2 vols., edited by Chauncey M. Depew. New York, 1895.

Oppenheimer, Seymour, M. D.: Effect of Certain Occupations on the Pharynx. New York Medical Record, December 16, 1899.

Ord, William, M. D.: In Sixth Report of the Medical Officer of the Privy Council. Article on the Sanitary Circumstances of Dressmakers and other Needlewomen, London, p. 362. London, 1864.

Order of the Secretary of State making Regulations for the Protection of Health in Cotton Cloth Factories. Parliamentary Returns. Dated London, February 18, 1898.

Parkes, E. A.: Manual of Practical Hygiene. Article on Diseases of Operatives, Vol. I, pp. 133–136. William Wood & Co., New York, 1883.

Parry, Leonard A., M. D.: The Risks and Dangers of Various Occupations and their Prevention. Scott, Greenwood & Co., London, 1900.

Physical and Moral Condition of the Children and Young Persons Employed in Mines and Manufactures. Parliamentary Report. London, 1843.

Polishing and Buffing. Article in Annual Report of the New York State Factory Inspector, p. 32. Albany, 1899.

Polishing Wheels, Construction of, etc. Scientific American Supplement, No. 1569, pp. 25139, 25140, January 27, 1906.

Potter, Alonzo, M. D.: The Principles of Science Applied to the Domestic and Mechanic Arts. Boston, 1841.

Pottery Industry and its Relation to Health. Twelfth Annual Report of the New Jersey Bureau of Labor, p. 39. Trenton, 1889.

Pottery Industry, Diseases and Disease Tendencies of Industries. In Report of New Jersey Bureau of Labor Statistics, p. 107. Trenton, 1908.

Pottery Industry, Health Conditions in. Article in Twenty-eighth Annual Report of New Jersey Bureau of Labor, p. 175. Trenton, 1905.

Printworks, Bleaching and Dyeing Works Acts. Parliamentary Report on Conditions in these Trades. London, 1869.

Prudential Insurance Company of America: Industrial occupation mortality statistics, exhibits of diagram and charts at International Exposition, Paris, 1900; International Congress on Tuberculosis, London, 1901; Pan American Exposition, Buffalo, 1901; International Exposition, St. Louis, 1904; Jamestown Ter-Centennial Exposition, 1907; International Congress on Tuberculosis, Washington, 1908. Also address by Frederick L. Hoffman, statistician, Prudential Insurance Company of America, on Relation of Occupation to Tuberculosis, American Association of Life Insurance Medical Examiners, Atlantic City, 1907; address on Dust as a Factor in Occupation Mortality, New York County Medical Society, 1907; and address on Tuberculosis as an Industrial Disease, International Congress on Tuberculosis, Washington, 1908.

Purdon, Harry S., M. D.: Flax and Linen Manufacture. Article in Dangerous Trades, p. 691. London, 1902.

Ramazzini, Bern.; A Treatise of the Diseases of Tradesmen. London, 1705.

Ramazzini, Bern.: The Diseases of Tradesmen, Reference to, in Journal of the Institute of Actuaries, Vol. I, p. 84. London, 1851.

Ramsey, M. E., M. D.: Practical Life Insurance Examination. Article on Occupation, p. 20. Philadelphia, 1908.

Ransome, Arthur, M. D.: The Need of a Standard of Efficient Ventilation in Work-places and Places of Public Assemblies. Transactions of British Congress on Tuberculosis, Vol. II, p. 120. London, 1902.

Ratcliffe, Henry: Observations on the Rate of Mortality and Sickness—Friendly Societies Particularized for Various Trades, Occupations, and Localities. Manchester, 1850.

Renk, Dr. Friedrich: Die Luft (The Air), in Handbuch der Hygiene, Pettenkofer and Ziemssen. Leipzig, 1886.

Report of the Royal Commission on Noxious Vapours. Parliamentary Paper, C. 2159. London, 1878.

Richardson, B. W.: Diseases of Modern Life. Article on Induced Diseases from Physical Strain, p. 148; Diseases from Impurity of the Air, p. 375; Diseases Incident to Some Occupations, p. 397. New York, 1876.

Richardson, B. W.: Unhealthy Trades. Lectures before the Society of Arts; reprinted in Scientific American Supplement No. 9 (February 26, 1876); No. 10 (March 4, 1876); No. 18 (April 29, 1876); No. 19 (March 6, 1876); No. 22 (May 27, 1876).

Roth, Dr. Em.: Article on Allgemeine Gewerbehygiene und Fabrikgesetzgebung (Industrial Hygiene and Factory Legislation), in Handbuch der Hygiene, Vol. III, edited by Theodor Weyl. Jena, 1897.

Royce, Samuel: Deterioration and Race Education. Article on Factory Population, p. 41; Consumption, p. 42; Effect of Trades on Health, pp. 448 et seq.

Rumsey, Henry W., M. D.: Essays and Papers on Some Fallacies of Statistics Concerning Life and Death, Health and Disease, p. 234. London, 1875.

Russell, Archibald: Principles of Statistical Inquiry. Article on Occupations in Which the Inhabitants are Engaged, p. 121. New York, 1839.

Russell, James B., M. D.: On Certain Cases of Sickness and Death Occurring Among Workers in Horsehair Factories. In Annual Report of the Medical Officer of the Local Government Board, 1878, p. 321. London, 1879.

Samwer, Karl: Address on the Mortality in Certain Occupations. Read before the Third International Actuarial Congress, Paris, 1900. (In French.)

Samwer, Dr. Karl: Die Sterblichkeit der Aerzte, Geistlichen und Lehrer nach den Erfahrungen der Gothaer Lebensversicherungs-Bank (Report on the Mortality of Physicians, Clergymen, and Teachers in the Experience of the Life Insurance Company of Gotha). Address before the Third International Actuarial Congress, Paris, 1900.

Sanitary Commission of Massachusetts. Reference to Influence of Occupation on Health, pp. 85, 129, and 508. Boston, 1850.

Sanitary Condition of the Laboring Population, Parliamentary Report on the. London, 1842. Article on Erroneous Inferences as to the Effect of Particular Occupations, p. 113 (including remarks upon tobacco, tailoring, etc.); article on Comparative Chances of Life in Different Classes of the Community, p. 153; article on the Most Advantageous Construction for Securing the Health of Work People in Factories, p. 240.

Sanitary Economy, Its Principles and Practice (anon). Rich and Poor, p. 126; Condition in Manufactures, p. 171; Considerations as to Unhealthy Occupations, p. 245. Edinburgh, 1850.

Sanitary Institute Transactions, Vol. XXIII, 1902, p. 209. Address by Sir James Crichton-Browne, M. D., on The Dust Problem.

Schafer, Dr. H.: Article on Hygiene der Glasarbeiter und Spiegelbeleger (Hygiene of Glass and Mirror Manufacture). In Handbuch der Hygiene, Vol. VIII, pp. 971, edited by Theodor Weyl. Jena, 1897.

Scotland: Supplement to the Thirty-eighth Detailed Annual Report of the Registrar-General of Births, Deaths, and Marriages in Scotland. Edinburgh, 1895. Occupation Mortality Statistics for 1890–1892, pp. xlii–lix.

Scotland: Supplement to the Forty-eighth Detailed Annual Report of the Registrar-General of Births, Deaths, and Marriages in Scotland. Glasgow, 1905. Occupation Mortality Statistics for 1900–1902.

Scott, Alexander: The Notification of Industrial Diseases. British Medical Journal, August 22, 1908, p. 488.

Scottish Amicable Life Assurance Society: Mortality Experience, 1826–1860, by Hazardous and Nonhazardous Occupations. Journal Institute of Actuaries, Vol. X, p. 61. London, 1861.

Scurfield: Mortality of Dusty Trades in Sheffield. British Medical Journal, August 22, 1908, p. 480.

Seaton, Doctor: Report on Certain Offensive Trades in Southwark. Ninth Annual Report of the Medical Officer of the Privy Council, p. 209. London, 1867.

Shadwell, Arthur, M. D.: Industrial Efficiency, New York, 1906. Article on Industrial Districts of America, Vol. I, p. 243; Factory Laws, Vol. II, p. 1; Factory Conditions, p. 47; Social Conditions, p. 252.

Sheffield, England, Annual Reports on the Health of. Special Tables and Observations on Mortality in Sheffield Trades, 1889–1907.

Simon, John, C. B., F. R. S.: Article on Industrial Diseases. In Annual Report of the Medical Officer of the Privy Council, p. 10. London, 1863.

Simon, John, C. B., F. R. S.: Public Health Reports. (Privy Council Medical Report, 1858–1872; Local Government Medical Reports, 1874–1876; Privy Council Medical Report, 1874–1877, etc.) Reprinted by the Sanitary Institute of Great Britain, in two volumes. London, 1887.

Simon, John, C. B., F. R. S.: Question of Pecuniary Compensation for Commercial and Administrative Injuries to Health. Twelfth Annual Report of the Medical Officer of the Privy Council, p. 34. London, 1870.

Simon, John, C. B., F. R. S.: Remarks on the Present State of the Law as Regards the Recovery of Compensation by Persons who have been Injured in Health or by Loss of Relatives, Through the Fault of Local Authorities or Water Companies. In Tenth Annual Report of the Medical Officer of the Privy Council, p. 12. London, 1868.

Simon, Robert M., B. A.: Copper and Brass. Article in Dangerous Trades, p. 455. London, 1902.

Sizing Processes in Cotton Manufacture. Parliamentary Returns. London, May 13, 1872.

Smee, A. H., M. R. C. S.: Tables and Diagrams Illustrating the Comparative Death Rates from Various Causes and in Various Occupations. London, 1901.

Smith, Edward, M. D.: On the Nourishment of the Distressed Operatives in the Cotton Towns of Lancashire and Cheshire. In Privy Council Medical Report, p. 320. London, 1863.

Smith, Edward, M. D.: In Sixth Report of the Medical Officer of the Privy Council. Article on the Sanitary Circumstances of Printers in London, p. 416. London, 1864.

Smith, Richmond Mayo: Statistics of Occupation. Article in Essays on the Federal Census, published by the American Economic Association, p. 78. New York, 1899.

Smith, Watson, F. I. C.: Manufacture of Alkalis and Acids. Transactions Sanitary Institute, Vol. XIV, p. 169. London, 1893.

Sommerfeld, Dr. Th.: Handbuch der Gewerbekrankheiten (Handbook of Industrial Diseases), Vol. I. Berlin, 1898.

Sommerfeld, Dr. Th.: Article on Hygiene der Steinmetzen und Maurer (Hygiene of Stone Cutters and Stone Masons, etc.). In Handbuch der Hygiene, Vol. VIII, p. 947, edited by Theodor Weyl. Jena, 1897.

Sonne, Dr. Wilhelm: Article on Hygiene der Keramischen Industrie (Hygiene of the Pottery Industry). In Handbuch der Hygiene, Vol. VIII, p. 911, edited by Theodor Weyl. Jena, 1897.

Special Regulations for Dangerous and Unhealthy Industries Enforced by the Factory Inspectors in England. Twenty-fourth Annual Report of the New York State Bureau of Labor Statistics, p. 833. Albany, 1907.

Squire, Rose E.: Rabbit Down Manufacture. Article in Oliver's Dangerous Trades, p. 724. London, 1902.

Standen, William T.: Effect of Occupation and Habits on Health and Life Insurance Risks. No date.

Stevens, Geo. A.: The Health of Printers. Twenty-fourth Annual Report of the New York State Bureau of Labor Statistics, 1906, pp. lxxi–clii. Albany, 1907.

Stickler, J. W., M. D.: On Hatters' Consumption. Reprinted from New York Medical Journal, May 29, 1886.

Stockton-Hough, John, M. D.: of Philadelphia. Article on Relative Influence of City and Country Life on Mortality. No date.

Stuart, John A. E., M. D.: Rags and Their Product in Relation to Health. Article in Oliver's Dangerous Trades, p. 644. London, 1902.

Symonds, Brandreth: Life Insurance Examination. Article on Occupation, p. 107. New York, 1905.

Tatham, John, M. D.: Dust-Producing Occupations. Article in Oliver's Dangerous Trades, p. 134. London, 1902.

Tatham, John, M. D.: Mortality of Occupations. Article in Oliver's Dangerous Trades. p. 118. London, 1902.

Tatham, John, M. D.: Report on the Mortality of Males in Certain Occupations, 1890–1892, and on an English Healthy District Life Table for the ten years 1881–1890. Supplement to the Fifty-fifth Annual Report of the Registrar-General of England and Wales, Vol. II. London, 1897.

Tatham, John, M. D.: Report on the Mortality in Various Occupations in the three years 1900–1902. Supplement to the Sixty-fifth Annual Report of the Registrar-General of England and Wales, Part II. London, 1908.

Thackrah, C. Turner: The Effects of Arts, Trades, and Professions and the Civic States and Habits of Living on Health and Longevity, with Suggestions for the Removal of Many of the Agents which Produce Disease and Shorten the Duration of Life. Second edition. London, 1832.

Thomson, J.: Hats and Felting. Philadelphia, 1868.

Tiepen, J. J. H.: On the Best Plan for Preparing and Publishing Government Statistics Concerning Dangerous Occupations and the Mortality Therein. Address before Fourth International Actuarial Congress, New York, 1903.

Tissot, S. A., M. D.: An Essay on the Disorder of People of Fashion; and a Treatise on the Diseases Incident to Literary and Sedentary Persons. Edinburgh, 1772.

Tomlinson, Charles: Cyclopedia of Useful Arts. London, New York, 1852. (In 4 volumes.)

Tomlinson, Charles: The Useful Arts and Manufactures of Great Britain; first series, Textile Fabrics. London. No date.

Tomlinson, Charles: The Useful Arts and Manufactures of Great Britain; second series, Metals, Chemical Manufactures, etc. London. No date.

Towles, John K.: Factory Regulation in Rhode Island. Publications of the American Economic Association, Vol. IX, No. 3, October, 1908. New York.

Tracy, Roger S.: Article on Dusty Occupation. In Second Annual Report of the New York State Factory Inspector for 1888, p. 68. Albany, 1889.

Tracy, Roger S., M. D.: Hygiene of Occupations. In Buck's Hygiene and Public Health, Vol. II. New York, 1879.

Tuberculosis, Report of Special Commission appointed to investigate. Article on Factory Conditions, p. 37. Hartford, Conn., 1908.

Tyndall, John: A Combat with an Infective Atmosphere. Article in Popular Science Monthly, April, 1877.

Upson, Charles R., M. D.: Mensuration as an Aid to the Diagnosis of Pulmonary Tuberculosis. Article in American Medicine, May 31, 1902.

Ure, Andrew, M. D.: Dictionary of Arts and Manufactures with Supplement. (3 volumes.) New York, 1868.

Velvet Works: Ending and Mending Processes. Third report on Dangerous Trades, p. 30; also fourth report, Parliamentary Paper, C. 9420, p. 5. London, 1899.

Ventilation of Factories. Article in Eighth Annual Report of the New York State Factory Inspector for 1893, p. 42. Albany, 1894.

Ventilation of Factories and Workshops. Report of Departmental Committee, First and Second, with Appendix. Parliamentary Reports, C. 1302 and Cd. 3552. London, 1902–1907.

Vital Statistics, Tenth Census (for 1880), 2 vols., Washington, 1885 (no occupation mortality analysis); Eleventh Census (for 1890), 2 vols., Washington, 1894–95; Twelfth Census (for 1900), 2 vols. Washington, 1902.

Vocation and Longevity. New York Medical Record, April 12, 1902.

Wade, John: History of the Middle and Working Classes (third edition). Article on Effect of Trades on Health, p. 244; Table of Comparative Duration of Life in Agricultural and Manufacturing Districts, p. 560. London, 1835.

Walford, C.: Insurance Cyclopedia. Article on Practice of Friendly Societies with Reference to Unhealthful Trades, Vol. IV, p. 584. London, 1876.

Ward, S. H., M. D.: Occupations, etc.; Influence on Health. Article in Journal of the Institute of Actuaries, Vol. VIII, pp. 255–263. London, 1860.

Welfare Institutions in Austria (Die Wohlfahrts-Einrichtungen der Arbeitgeber zu Gunsten ihrer Angestellten und Arbeiter in Österreich), Vol. II. Published by the Imperial and Royal Statistical Bureau of the Department of Commerce. Vienna, 1904.

Welfare Work, Report on Conference on. Published by the National Civic Federation, New York, 1904.

Westergaard, Harold: Die Lehre von der Mortalitat und Morbidität (Mortality and Morbidity). Anthropologisch-Statistische Untersuchungen. Anthropological-Statistical Investigations, chaps. XV to XVIII. Auch Berufsänderungen (also occupation changes), p. 134. Jena, 1901.

Westergaard, Harold: Occupation Mortality, with special reference to the Statistics of Scotland. Article in Ehrenzweigs Insurance Year Book, 1907.

Wheatley, James, M. D.: Manufacture of Cotton. Article in Oliver's Dangerous Trades, p. 702. London, 1902.

Wheatley, James, M. D.: Trade Mortality Statistics. Reprinted from Public Health, February, 1903.

White, Sinclair, M. D.: Metallic Dusts, Cutlery, Tool Making, and Metal Trades. Transactions Sanitary Institute, Vol. XIV, p. 117, 1893.

White, Sinclair, M. D.: Steel Grinding. Article in Oliver's Dangerous Trades, p. 408. London, 1902.

Whitley, George, M. D.: Report on Industrial Diseases; in Sixth Annual Report of the Medical Officer of the Privy Council. Article on Occurrence of Lead Poisoning Among Persons who Work with Lead or its Preparations, p. 350; Occurrence of Mercurial Preparations, p. 358. London, 1864.

Wierdema, H. V., M. D.: Article on Visual Acuity in Various Trades. In Journal American Medical Association, February 8, 1902. Chicago.

Wilbur, Cressy L.: Mortality Statistics of the Eleventh Census. Article, American Economic Association, p. 108. New York, 1899.

Willcox, Walter F.: Economic Loss from Tuberculosis in the State of New York. Abstract from address before International Congress on Tuberculosis, Washington, D. C., 1908.

Willcox, Walter F.: Economic Value of Loss of Life from Tuberculosis. Article in Vital Statistics of New York State in 1907. Albany, 1908.

Willets, Gilson, and others: Workers of the Nation. Dodd, Mead & Co. (2 vols.), New York, 1903.

Williams, C. Theodore, M. D.: Article on Diseases, Accidents, and Occupation, Deaths. In American Exchange and Review, Philadelphia, December, 1904.

Wilson, G. B.: Air-Conditioning in Textile Factories, p. 25. John Wiley & Sons. New York, 1908. (Reference to Suitable Textile Conditions and Their Relation to Health.)

Wilson, Harry J.: Jute Manufacture. Article in Oliver's Dangerous Trades, p. 650. London, 1902.

Winslow, C. E. A.: Sanitary Dangers of Certain Occupations. Bulletin of Massachusetts Association of Boards of Health. Boston, 1904.

Wool Sorting and Kindred Trades. Report of the Dangerous Trades (Anthrax) Committee; Parliamentary Report, C. 8506. London, 1907.

Wright, Carroll D.: Report on the Factory System of the United States. Tenth Census. Article on Effect of the Factory upon Health, p. 26. Washington, D. C., 1882.

Wynne, James, M. D.: Report on the Vital Statistics of the United States made to the Mutual Life Insurance Company of New York, 1857, p. 205.

Wynter, A., M. D.: Curiosities of Civilization. Article on Mortality in Trades and Professions, pp. 499–535. London, 1860.

CHARITY RELIEF AND WAGE EARNINGS.

BY S. E. FORMAN.

INTRODUCTION.

This article is a study of the relief given by the Associated Charities in the city of Washington, D. C., in 1905. The investigation deals with the cases of several thousand persons who sought relief at the door of charity. The aim of the study is to determine the relation which exists between the charity relief and the earnings of the recipients, and to discover to what extent this distress was due to low wages or to a lack of employment, and to what extent other causes figured in the distress.

The result of the study will be better understood if consideration is first given to the aims and methods of the Associated Charities. Those aims and methods have been recently formulated as follows:

1. To bring about the adequate treatment of each needy individual or family upon the basis of an adequate understanding of the needs and resources.
2. To promote cooperation between all the philanthropic forces, the public and private charities, the churches, municipal authorities, and benevolent individuals of the community, in order that the efficiency of all may be increased and each enabled to do its own best work in its own best way.
3. To obtain and administer material aid where necessary, endeavoring to secure the assistance from appropriate organizations and individuals, and not to interfere with or unnecessarily decrease in any case the responsibility of agencies or persons from whom the relief should be derived.
4. To enlist, organize, and direct volunteer workers, including division conference members, friendly visitors, savings collectors, conductors of outing parties, office assistants, and helpers in other lines.
5. To prevent pauperism and dependence, to discourage begging and the giving of alms without adequate investigation, to expose deliberate imposture or fraud, to not merely palliate distress but to relieve it permanently, and in every case to develop all the possibilities of self-help.
6. To improve home life, develop character, and elevate the standards of life, to prevent children from growing up as paupers, and to aid needy families in securing for ruptured and deformed children such treatment as will prevent permanent disabilities and dependence.

7. To aid in the diffusion of knowledge as to conditions of life in neglected neighborhoods or among needy families and as to the best methods of philanthropic work. To suggest, stimulate, inaugurate, or undertake such efforts for remedial, preventive, or constructive social service as shall from time to time seem wise.

8. To maintain a careful, thorough system of confidential records so that all the essential knowledge obtained regarding needy families may be immediately available, in confidence, for the guidance of persons having a legitimate charitable interest.

9. To exclude from every department of its work all questions as to sectarian religious belief, politics, or nationality, and to allow no representative of the association to use his or her position for the purpose of proselytism.

From the above official statement it will be seen that an office of the Associated Charities is not primarily a relief station. It is rather a clearing house where various charitable influences are so coordinated and directed that overlapping, waste, and fraud are either wholly prevented or reduced to a minimum. Relief of some kind is given to almost every family that applies to the Associated Charities, but it is not always material relief—such as money, food, or clothing. The chief object of the association is to enable the applicant to help himself. "Every case is studied carefully, unnecessary relief is refused, employment is secured, the good influence of relatives, employers, and other natural helpers is enlisted, and every possibility of self-help is as far as possible discovered and emphasized."[a] Such a policy reduces the giving of material aid to the lowest point. Of the 4,377 families dealt with in the charity year ending June 30, 1906, only 1,050 were given material relief. After such a sifting process a family is not likely to receive material aid unless there is actual distress.

A phase of the society's work that is of great interest is its system of gathering and recording all pertinent facts relating to the family applying for aid. This inquiry begins when application for assistance is made. The investigation is informal and unobtrusive, but thorough and painstaking. Information about the family is sought from the most direct sources. Letters of applicants and the representations of proxies may set in motion an investigation, but they will not suffice to place the family upon the roll of recipients. A personal inspection of home conditions by the charity agent must be made before the merits or demerits of an application are passed upon. In cases of emergency or when the work of the office is heavy this rule is not always strictly followed. At such times the giving of aid may precede the investigation; but the general policy and the habitual

[a] Annual Report of the Associated Charities of the District of Columbia, 1906, p. 6.

practice of the society is to furnish aid only in the light of the fullest knowledge possible.

The investigation into the merits of an application usually begins in the charity office. When a request is made that aid be given to a family, if the person asking for aid is not a member of the family, or is a child, the agent probably will not entertain the request at all, but will demand that a responsible member of the family come to the office. If the wife or husband or grown child comes and makes known the needs of the family, the agent in a conversational way draws from the applicant everything about the family that may have a bearing upon the subject in hand. Inquiry is made as to the size of the family, the ages of the children, the conjugal conditions that prevail, the occupations of the members of the family, the wages received, the names of employers and friends, and church affiliations. Having noted these and other relevant facts, the agent, withholding aid for the time being, promises to visit the home of the applicant at the earliest possible moment. Only in rare instances does the first interview result in the immediate giving of doles. As soon as it can be arranged the agent goes to the home of the applicant, where the inquiry is continued far beyond the point to which it was carried at the office and until sufficient information is obtained regarding the family to make it possible to deal with the case intelligently.

The facts brought out by the investigation are arranged in order, typewritten, and placed in a large envelope which becomes the receptacle for the charity record of the family and for all documents bearing upon that record. In this envelope are found letters applying for aid, letters expressing thanks for aid received, letters from friends and relatives of the family, letters of recommendation, correspondence of charity officials, newspaper clippings containing information about the family, ejectment notices, evidences of chattel-mortgage transactions, and notes of promise. Every item throwing light upon the charity side of the family's history is carefully preserved. In the majority of cases the record is brief and the contents of the envelope are small, but in many cases where the charity record extends over many years the contents of the envelope, if printed, would make a good-sized volume.

The conclusions of this article are based upon a study of 19,000 envelopes found in the 8 charity offices of the city of Washington. Every envelope containing a record of material relief, such as money, food, clothing, or shelter given in 1905 has been examined. The work has been conducted in the charity offices, and in numerous cases when there was perplexity or doubt the writer has been assisted by the charity agents.

NUMBER, NATIVITY, AND SIZE OF THE FAMILIES.

In dealing with charity cases the efforts of the organization are directed toward the family regarded as a social unit. Likewise in studying these charity cases the family has been regarded as a unit, but strictly as an economic rather than as a domestic unit. A man living alone in a shanty or in a single room has been regarded as constituting a family of one, even though he has children living. Where a husband is serving a term in jail and the wife is left to take care of herself and several children, the family is regarded as consisting of the wife and children, and the husband is not included in the enumeration. In dealing with the subjects of delinquencies and of causes, however, it has often been found necessary to look outside the economic group.

Of the 1,256 families for which the records showed that material relief was given in 1905, 73 have not been considered in this article. In a number of cases it was impossible to determine the composition of the family in 1905. In such cases the record extended over a number of years, but the changes that came with the years were not fully recorded. In other cases, because of a rush of applications, aid was given without any investigation at all. In a few instances the records were too meager to serve the purposes of this study. There remained for consideration the charity records of 1,183 families, 452 of these being white families and 731 colored.

The nativity of the recipients is shown in the following table. It is seen that nearly all who were assisted were Americans. Only 40 families, or 3.4 per cent of the total, were of wholly foreign extraction. This element is so small as to be without special significance, yet it is noticeable that whereas the foreign population of the city is about 7 per cent of the total population foreign charity recipients constitute a percentage only about half as great. When the number of white families is compared with the number of Negro families it is found that the former comprise 38.2 per cent and the latter 61.8 per cent of all the families receiving aid. In 1900 the white population of the District was 68.7 per cent and the Negro population was 31.1 per cent of the whole population.

NUMBER OF WHITE AND OF NEGRO FAMILIES RECEIVING AID IN 1905, BY NATIVITY OF HEAD OF FAMILY.

Nativity of—		Number of families.	Nativity of—		Number of families.
Husband or male head of family.	Wife or female head of family.		Husband or male head of family.	Wife or female head of family.	
WHITE.			WHITE—conc'd.		
United States	United States	[a] 236	Poland	Poland	1
United States		[b] 20	Russia		[e] 1
	United States	[c] 142	Scotland		[d] 1
United States	England	1	Turkey	United States	[g] 1
United States	Germany	2		England	[h] 2
United States	Ireland	2		France	[i] 1
United States	Italy	1		Germany	[j] 4
United States	Scotland	1		Ireland	[k] 3
United States	Sweden	1		[l]	[m] 2
Austria	Austria	1			
Denmark	Denmark	1	Total white		452
Denmark	Sweden	1			
England	Germany	2	NEGRO.		
England	Ireland	1			
France	France	2	United States	United States	293
France		[d] 1	United States		[n] 45
Germany	United States	2		United States	[o] 390
Germany	Germany	7		Bahama Islands	[p] 1
Germany	Poland	1		Germany	[p] 1
Hungary		[e] 1	West Indies	United States	1
Ireland	United States	4			
Ireland	Ireland	3	Total Negro		731
Italy	Italy	1			
Italy		[f] 1	Grand total		1,183
Norway	United States	1			

[a] Including 2 families in which the husband is white and the wife colored.
[b] Comprising 4 widowers, 13 single men, 2 separated men, and 1 man conjugal condition not reported.
[c] Comprising 83 widows, 34 separated women, 17 single women, 2 divorced women, 5 married women whose husbands were not at home, and 1 woman conjugal condition not reported.
[d] Widower.
[e] Single man.
[f] Separated man.
[g] Wife a Negress.
[h] Comprising 1 widow and 1 woman whose husband was in jail.
[i] Separated woman.
[j] Comprising 2 widows and 2 separated women.
[k] Single women.
[l] Nativity not reported.
[m] Comprising 1 widow and 1 separated woman.
[n] Comprising 24 widowers, 5 men conjugal condition not reported, 4 separated men, 10 single men, and 2 married men whose wives were not at home.
[o] Comprising 215 widows, 90 separated women, 64 single women, 13 married women whose husbands were not at home, 2 divorced women, and 6 women conjugal condition not reported.
[p] Widow.

The number of persons in the 1,183 families receiving material aid from the Associated Charities in 1905 was 4,365. Of these 1,860 were white persons and 2,505 were colored persons. If the 73 families which were eliminated on account of imperfect records had been included the total number of persons would have approximated 5,000. The number receiving material aid, however, by no means fully measures the work of the organization in Washington. In addition there are thousands who are assisted by the organization but who do not actually receive money, food, or clothing. A very large number of applicants desire free medical treatment, and this they receive at

public dispensaries upon the recommendation of the charity agents. A great many seek employment and the charity agents find work for them. Some who seek material aid are shown a way by which they may help themselves and thus avoid being enrolled as objects of charity. It is probable, taking the official reports of the association as a guide in making an estimate, that 15,000 persons per annum are affected in one way or another by the work of this organization.

The 4,365 recipients of material aid, it should be clearly understood, are for the most part the floating, unattached poor. In a very true sense they are the derelicts of society. The ties that morally bind the individual to society have been in a large degree severed. They rarely belong to a union or to a lodge; they have no friends or relatives to whom they can turn for help; they have no church connections. Industrially and socially they are without moorings, and when the hour of distress overtakes them they drift to the charity office, because they have nowhere else to go.

The isolation of this class of charity recipients is brought out when the subject of the membership of the wage-earners in labor organizations and in fraternal and beneficial associations is considered. The records are not entirely satisfactory, though efforts are made to secure as much information as possible about the lodges and societies to which the applicants belong. In nineteen cases out of twenty there is nothing to learn. Of 1,775 wage-earners only 81 made any statement as to whether they belonged to labor organizations, and of these only 23 stated that they were members of such organizations. In only 40 families was there evidence of membership in fraternal or beneficial societies. The reason for not belonging to labor organizations and the result of nonmembership appear frequently in notes and comments of the agent like the following:

"He (the wage-earner) does not belong to the union, and for that reason finds it difficult to get work."

"The husband said he thought X could get him work to do if he (X) cared to do so, but the husband does not belong to a union and X does." (Here X was the father-in-law of the applicant.)

"Man (a carpenter) had gone to a job of work but when the other workmen found he was a nonunion man, they objected. Man made inquiry about union and found he would have to pay $10 to join. This he could not do."

In the table which follows is shown the size of the families receiving relief. The average is 3.7 persons for each family. In 1900 the average size of the family in the District of Columbia was 4.9 persons. The charity family is therefore considerably smaller than the normal family. The lower average of the charity family is due to the fact that among the very poor there is an unusually large num-

ber of families consisting of but one or two persons. The father or the mother, or both father and mother, either childless or forsaken by their children, live alone until old age comes on and the earnings become so scant that resort must be made to charity. The table shows that nearly 40 per cent of the families receiving aid were families of one or two persons. In the District of Columbia in 1900 not quite 20 per cent of the whole number of families belonged to this class. If the families consisting of one and of two persons are excluded, the average number of persons in the charity family is increased to 5, which is about normal. The figures bearing upon the size of the family, therefore, contain nothing of great significance. The poverty-stricken family on the average is about the same size as the prosperous family.

NUMBER OF WHITE AND OF NEGRO FAMILIES RECEIVING AID IN 1905, BY SIZE OF FAMILY.

Size of family.	White.		Negro.		Total.	
	Families.	Persons.	Families.	Persons.	Families.	Persons.
One person	67	67	156	156	223	223
Two persons	71	[a] 142	145	[b] 290	216	432
Three persons	56	[c] 168	139	[d] 417	195	585
Four persons	72	288	88	352	160	640
Five persons	56	[c] 280	67	[d] 335	123	615
Six persons	58	348	67	402	125	750
Seven persons	34	238	29	203	63	441
Eight persons	22	176	23	184	45	60
Nine persons	8	72	9	81	17	353
Ten persons	7	70	6	60	13	130
Eleven persons	1	11	1	11	2	122
Fourteen persons	.....	.....	1	14	1	14
Total	452	[e] 1,860	731	[f] 2,505	1,183	4,365

[a] Including 1 Negro, member of white family.
[b] Not including 1 Negro, member of white family.
[c] Including 4 Negroes, members of white families.
[d] Not including 4 Negroes, members of white families.
[e] Including 9 Negroes, members of white families.
[f] Not including 9 Negroes, members of white families.

AGE AND CONJUGAL CONDITION.

The following table shows the leading facts in respect to the ages of the charity recipients and to the conjugal conditions which prevailed among them. When collecting facts with respect to age the charity agent meets with the same difficulties that perplex the census agent. The ages, particularly of children, are often not known and ages of very old people must frequently be guessed. Still, taken all in all, the age records, especially those of children, are full and fairly satisfactory.

NUMBER OF WHITE AND OF NEGRO PERSONS OF EACH SEX RECEIVING AID IN 1905, BY CONJUGAL CONDITION AND AGE PERIODS.

Conjugal condition and age period.	White.			Negro.			Total.		
	Male.	Female.	Sex not reported.	Male.	Female.	Sex not reported.	Male.	Female.	Sex not reported.
Single:									
Under 10 years	253	267	76	291	365	95	544	632	171
10 or under 16 years	162	162	11	159	229	12	321	391	23
16 years or over	91	93	1	98	187	.....	189	280	1
Age not reported	10	10	8	13	35	9	23	45	17
Total	516	532	96	561	816	116	1,077	1,348	212
Married:									
16 years or over	274	281	.....	302	316	.....	576	597	.....
Separated (deserted):									
16 years or over	3	39	.....	4	97	.....	7	136	.....
Age not reported	.....	.....	.....	.....	1	.....	.....	1	.....
Total	3	39	.....	4	98	.....	7	137	.....
Widowed:									
16 years or over	7	102	.....	26	236	.....	33	338	.....
Age not reported	.....	.....	.....	.....	2	.....	.....	2	.....
Total	7	102	.....	26	238	.....	33	340	.....
Divorced:									
16 years or over	1	3	.....	.....	2	.....	1	5	.....
Conjugal condition not reported:									
16 years or over	3	3	.....	7	10	.....	10	13	.....
Age not reported	.....	.....	.....	1	2	6	1	2	6
Total	3	3	.....	8	12	6	11	15	6
Grand total	804	960	96	901	1,482	122	1,705	2,442	218

An analysis of the age periods brings out the fact that there is a much larger percentage of children under the age of 16 in the charity population than there is in the population at large. In 1900, 26.6 per cent of the entire population of the District of Columbia was under the age of 16, while in the charity population studied 47.7 per cent was under the age of 16. Analysis further shows that the percentage of children under 10 years of age was 30.9 per cent in the charity families, while the percentage of children under 10 in the entire District was only 16.8 per cent of the total population. Young children, therefore, are relatively very numerous among charity dependents in the District of Columbia, a fact of considerable significance. In families where there are many small children much of the time and energy that might be given to breadwinning is of necessity given to the care of the children. In some of the families a care taker—usually an old woman who could do nothing else—was provided for the children and all the older persons were thus permitted to go out and earn something.

Not only do children under 10 years of age predominate in these families, but the female children are proportionally more numerous

than they are in the average family. In 1900 in the District of Columbia the number of males under 16 years of age was 36,517, and the number of females 37,683, the excess of females over males being 3.2 per cent. A comparison of the figures given in the preceding table shows that the females under 16 years of age are in excess of the males by 18.3 per cent. If comparison is made only for the children of 10 or under 16 years it is found that in the District the excess of females over males is 8.1 per cent, whereas in the charity population the excess is 21.8 per cent. In whatever way they are considered the figures point to a large proportion of girls in the charity families. In so far, then, as the boy is a better wage-earner than the girl, so far this excess of female children must be regarded as a handicap in the struggle for subsistence. Not the actual number of children in these families, but the sex of the children is significant.

In respect to the conjugal conditions prevailing among these charity recipients the table gives information regarding separation (desertion), widowhood, and divorce. It is seen that in the 1,183 families there were 144 deserted persons. In 137 of these cases the wife was reported as having been deserted and in 7 cases the husband was deserted. If only those cases are considered in which abandonment was possible, that is, those in which both husband and wife were living, this matter of desertion may be brought out more plainly. There were in all 736 families in which both husband and wife were living, and in these, as above stated, there were 144 cases of desertion, or 19.6 per cent. Among the Negroes desertion was much more frequent than among the whites. In the 322 white families which had both husband and wife living there were 42 cases of desertion, or 13.0 per cent; in the 414 Negro families of this class there were 102 cases of desertion, or 24.4 per cent.

The number of families in which either the husband or the wife was dead is also strikingly large, nearly 30 per cent of all the families belonging to this class. Of the 452 white families receiving aid 6 had widowers and 89 had widows at the head. Of the 731 colored families 24 had widowers and 218 had widows at the head. In these families there were 923 persons, 256 whites and 667 colored.

The figures show that the charity family is very often the fatherless family. There were 307 families in which the husband was dead. Including with these the 137 families that were abandoned by the husband it is found that 444 families, or 37.5 per cent of the total, were without male supporters at their head.

Divorce among the charity families played practically no part at all, there being only 6 divorced people among 4,365. This paucity of divorce cases is easily explained. The very poor can not afford divorcement. Separation is the cheap substitute for divorce.

OCCUPATIONS.

A study of the occupations of the charity recipients shows that they are by no means an idle or nonwage-earning class. Of the 2,186 persons reported as being 16 years of age or over, 1,687, or 77.2 per cent, were engaged in some kind of gainful occupation. Of those over 16 who had no gainful occupation the greater part consisted of old people and of women who as wives spent their time in housework. The number of families in which both husband and wife were gainfully employed was very large. Of the 271 white families in which there were both a husband and a wife living at home there were 95 in which both the husband and wife were gainfully employed, while of the 291 colored families having both husband and wife living at home there were 222 in which both the husband and the wife were gainfully employed. In respect to the employment of married women the broad facts of the charity world resemble the broad facts of the world at large. The white married woman does not expect to work as a wage-earner, while marriage has little effect in reducing the number of Negro women at work. Extreme poverty, however, drives many white married women into the ranks of wage-earners, for the percentage of white wives with occupations in the charity families is much greater than the percentage of white married women gainfully employed in the District at large.

Among the children of the charity recipients 88, or 12 per cent, of those 10 or under 16 years of age were gainfully employed. In 1900 of 27,319 children in the District of Columbia from 10 to 15 years of age, 2,144, or 7.8 per cent, were reported as engaged in gainful occupations.[a] Thus child labor among the charity recipients is seen to be a considerably greater factor than it is among the people at large. But the statements of the charity records bearing on this topic do not tell the whole story. They show merely the number of children who were employed for a definite wage, whereas hundreds of children in the families receiving charity helped their mothers to do the washing and ironing which was so often the chief source of income; these have not been included in the enumeration here given, yet plainly they were engaged in gainful occupations.

The occupations of the chief wage-earners and of other wage-earners in the families receiving charity relief and the number of persons engaged in each occupation are shown in the two tables which follow:

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[a] See Bulletin of the Bureau of the Census, No. 68, p. 5.

NUMBER OF CHIEF WAGE-EARNERS IN WHITE AND IN NEGRO FAMILIES RECEIVING AID IN 1905, BY OCCUPATION, SEX, AND REGULARITY OF EMPLOYMENT AT NORMAL TIMES.

Occupation and sex.	White.				Negro.				Total.			
	Regular.	Irregular.	Regularity not reported.	Total.	Regular.	Irregular.	Regularity not reported.	Total.	Regular.	Irregular.	Regularity not reported.	Total.
MALES.												
Art eritie		1		1						1		1
Artists		2		2						2		2
Ash man					1			1	1			1
Bakers	1	2		3					1	2		3
Barbers					1	2	1	4	1	2	1	4
Blaeksmiths		1		1	1			1	1	1		2
Boatmen	1	1		2					1	1		2
Bookkeeper	1			1					1			1
Brewers	1	1		2					1	1		2
Brieklayers		5		5		2		2		7		7
Butehers		2		2						2		2
Carpenters		26		26		1		1		27		27
Caterer						1		1		1		1
Cement worker							1	1			1	1
Cigar maker		1		1						1		1
Chair caner						1		1		1		1
Clergymen		1		1		2		2		3		3
Clerks	6	2	1	9					6	2	1	9
Clothing eleaners		1		1		1		1		2		2
Compositors		5		5						5		5
Conductors	2			2					2			2
Cooks		1		1	3	4		7	3	5		8
Coopers		2		2						2		2
Eleetrieian		1		1						1		1
Engineers		3		3	1	1		2	1	4		5
Expressmen	1	1		2		5		5	1	6		7
Foreman of laborers						1		1		1		1
Gardeners		1		1		1		1		2		2
Government elerk		1		1						1		1
Government employee	1			1					1			1
Herb doetor		1		1						1		1
Hod earriers						8	1	9		8	1	9
Horse trader		1		1						1		1
Hostlers					1	1		2	1	1		2
Hucksters		12		12		2		2		14		14
Inspectors of lumber		1	1	2						1	1	2
Ironworkers	1	6		7					1	6		7
Janitors	2			2	2	1	1	4	4	1	1	6
Jobbers		3	1	4		7		7		10	1	11
Junk dealers						6		6		6		6
Laborers	13	83	1	97	16	183	7	206	29	266	8	303
Maehinists		2		2						2		2
Marble worker		1		1						1		1
Meehanie		1		1						1		1
Merehants		2		2						2		2
Metal worker		1		1						1		1
Missionary						1		1		1		1
Motormen	5			5					5			5
Musieians						2		2		2		2
Newspaper work		1		1						1		1
Oyster shueker	1			1					1			1
Painters	1	23	1	25					1	23	1	25
Paper hangers		3		3		1		1		4		4
Peddlers		1		1		1		1		2		2
Physieians		1	1	2						1	1	2
Plasterers		5		5		5		5		10		10
Plumbers		4		4						4		4
Rag pickers						2		2		2		2
Railroad employee	1			1					1			1
Sailors		2		2						2		2
Salesman		1		1						1		1
Sawyer	1			1					1			1
Scullion						1		1		1		1
Sexton					1			1	1			1
Shoemakers		2		2		3		3		5		5
Steam fitter		1		1						1		1
Stonebreaker						1		1		1		1
Stoneeutters		2		2						2		2
Stone mason	1			1					1			1

NUMBER OF CHIEF WAGE-EARNERS IN WHITE AND IN NEGRO FAMILIES RECEIVING AID IN 1905—Concluded.

Occupation and sex.	White.				Negro.				Total.			
	Regular.	Irregular.	Regularity not reported.	Total.	Regular.	Irregular.	Regularity not reported.	Total.	Regular.	Irregular.	Regularity not reported.	Total.
MALES—concluded.												
Street sweeper	.....	.....	1	1	.....	.....	.....	.....	.....	.....	1	1
Tailors	.....	1	1	2	.....	.....	.....	.....	.....	1	1	2
Teamsters	4	7	.....	11	9	18	2	29	13	25	2	40
Tinsmiths	.....	5	.....	5	.....	.....	.....	.....	.....	5	.....	5
Traveling salesman	.....	1	.....	1	.....	.....	.....	.....	.....	1	.....	1
Typewriter	.....	1	.....	1	.....	.....	.....	.....	.....	1	.....	1
Waiters	.....	1	.....	1	2	6	.....	8	2	7	.....	9
Watchmen	4	3	1	8	.....	.....	.....	.....	4	3	1	8
Occupation not reported	1	1	4	6	.....	1	4	5	1	2	8	11
Total males	49	241	13	303	38	272	17	327	87	513	30	630
FEMALES.												
Boarding-house keeper	.....	.....	.....	.....	.....	1	.....	1	.....	1	.....	1
Canvasser	.....	1	.....	1	.....	.....	.....	.....	.....	1	.....	1
Cash girl	1	.....	.....	1	.....	.....	.....	.....	1	.....	.....	1
Caterer	.....	.....	.....	.....	.....	.....	1	1	.....	.....	1	1
Charwomen	5	3	.....	8	1	.....	.....	1	6	3	.....	9
Clerks	1	1	1	3	.....	.....	.....	.....	1	1	1	3
Cooks	.....	.....	1	1	.....	1	.....	1	.....	1	1	2
Domestics	4	[a] 34	.....	38	11	[b] 156	6	173	15	190	6	211
Dressmaker	.....	1	.....	1	.....	.....	.....	.....	.....	1	.....	1
Factory operators	1	.....	.....	1	1	.....	.....	1	2	.....	.....	2
Folder, printing office	.....	1	.....	1	.....	.....	.....	.....	.....	1	.....	1
Laborer	.....	1	.....	1	.....	.....	.....	.....	.....	1	.....	1
Laundresses	1	15	.....	16	13	134	6	153	14	149	6	169
Milliner	1	.....	.....	1	.....	.....	.....	.....	1	.....	.....	1
Nurses	.....	5	.....	5	.....	5	.....	5	.....	10	.....	10
Seamstresses	4	33	.....	37	.....	11	.....	11	4	44	.....	48
Telephone girl	.....	.....	1	1	.....	.....	.....	.....	.....	.....	1	1
Waitresses	1	1	.....	2	.....	.....	.....	.....	1	1	.....	2
Occupation not reported	.....	.....	1	1	.....	2	5	7	.....	2	6	8
Total females	19	[a] 96	4	119	26	[b] 310	18	354	45	406	22	473
Total, both sexes	68	[a] 337	17	422	64	[b] 582	35	681	132	919	52	1,103
Families for which no chief wage-earner was reported	.....	.....	.....	30	.....	.....	.....	50	.....	.....	.....	80
Total families	.....	.....	.....	452	.....	.....	.....	731	.....	.....	.....	1,183

[a] Including 1 Negro woman, chief wage-earner in a white family.
[b] Not including 1 Negro woman, chief wage-earner in a white family.

NUMBER OF WAGE-EARNERS OTHER THAN CHIEF WAGE-EARNERS IN WHITE AND IN NEGRO FAMILIES RECEIVING AID IN 1905, BY SEX AND OCCUPATION.

Occupation.	White.	Negro.	Total.	Occupation.	White.	Negro.	Total.
MALES.				FEMALES.			
Apprentice	1	.....	1	Agent	1	.....	1
Attendants at club	2	.....	2	Art work	1	.....	1
Barber	.....	1	1	Bookkeeper	1	.....	1
Bather's helper	.....	1	1	Bundle wrapper	1	.....	1
Bootblack	.....	1	1	Canvassers	2	.....	2
Chair caner	.....	1	1	Charwoman	1	.....	1
Clerks	8	1	9	Clerks	14	.....	14
Domestics	.....	2	2	Domestics	[a] 56	[b] 166	222
Driver	.....	1	1	Dressmaker	1	.....	1
Dyer and cleaner	.....	1	1	Errand girl	1	.....	1
Errand boys	8	.....	8	Factory operatives	2	.....	2
Jobbing	13	26	39	Governess	1	.....	1
Laborers	19	19	38	Government employee	1	.....	1
Messengers	5	2	7	Jobbing	3	.....	3
Musician	.....	1	1	Laundresses	26	139	165
Naval employee	1	.....	1	Messenger	1	.....	1
Newsboys	4	5	9	Musician	.....	1	1
Painters	2	.....	2	Nurses	3	7	10
Painter's apprentice	1	.....	1	Paper-mill operatives	1	1	2
Plumber's apprentice	1	.....	1	Rents rooms	1	.....	1
Porter	.....	1	1	Seamstresses	32	7	39
Teamsters	3	12	15	Stenographer	1	.....	1
Not reported	6	9	15	Telephone operators	2	.....	2
				Waitresses	2	.....	2
Total males	74	84	158	Not reported	13	25	38
				Total females	168	346	514
				Grand total	[a] 242	[b] 430	672

[a] Including 2 Negroes, members of white families.
[b] Not including 2 Negroes, members of white families.

These occupations represent almost every ordinary vocation. In the same list with laborers and domestics are art critics, musicians, physicians, missionaries, newspaper men, and clergymen. A couple, who in their younger days had kept at their own expense what was known as a "Tramps' Rest," where penniless wayfarers might receive food, raiment, and shelter, were in their old age compelled to become the objects of charity.

Although the list of occupations is long the distress was confined to a very few classes of people. The occupations of more than 60 per cent of the chief wage-earners were those of laborers, laundresses, and domestics, while among others than chief wage-earners these three classes formed 64 per cent of the whole. This was a result to be expected, for Washington on its industrial side is above all places a city of laborers, laundresses, and domestics.([a]) While this is true the table shows a number of charity recipients from the organized and well-paid trades. Twenty-seven carpenters, 25 painters, 10 plasterers, 9 clerks, 7 ironworkers, 5 shoemakers, and 4 plumbers were chief wage-earners in families that were driven to charity.

EARNINGS OF CHARITY RECIPIENTS.

The subject of the earnings of charity recipients is one of the most important connected with the subject of poverty and at the same time one of the most difficult to treat satisfactorily. When a family

[a] See Bulletin of the Bureau of Labor, No. 67, pp. 782–784.

applies for aid the earnings are inquired into at the outset. The inquiry as to the amount and source of income is painstaking and thorough, for aid must be given or withheld on the basis of the family income; yet the facts obtained by the inquiry are in most cases such as can not be conveniently tabulated. The period of charity seeking is a period when earnings are either irregular or abnormally low or when there are no earnings at all.

The following table gives the number of families in which the earnings of the chief breadwinner were normal at the time of the first application in 1905, the number in which the earnings were less than normal, and the number in which the chief wage-earner was earning nothing at all:

NUMBER OF WHITE AND OF NEGRO FAMILIES RECEIVING AID IN 1905 IN WHICH THE EARNINGS OF THE CHIEF WAGE-EARNER WERE NORMAL, LESS THAN NORMAL, OR NOTHING, BY SEX OF CHIEF WAGE-EARNER.

[This table does not include 80 families for which no chief wage-earner was reported.]

Earnings.	White families in which chief wage-earner was—		Negro families in which chief wage-earner was—		All families in which chief wage-earner was—		Total families reporting chief wage-earners.
	Male.	Female.	Male.	Female.	Male.	Female.	
Normal	24	14	17	23	41	37	78
Less than normal	1	1	1	3	2	4	6
Nothing	243	76	260	220	503	296	799
Not reported	35	[a] 28	48	[b] 109	83	137	220
Total	303	[a] 119	326	[b] 355	629	474	1,103

[a] Including 1 Negro woman, chief wage-earner in a white family.
[b] Not including 1 Negro woman, chief wage-earner in a white family.

The above table shows 220 cases as not reported. This does not mean that the records in these cases give no facts at all bearing upon the earnings of the chief wage-earner. It means that while the records give some kind of an account of the earnings they do not state their exact amount. For example, the record may say that the husband, a laborer, was at work with a construction company, but may say nothing whatever about the amount of his earnings. In this case it was certain that there were earnings, but it could not be determined whether they were normal or less than normal. Such a case, therefore, had to be classified in the tables "not reported."

The most significant item in the table is the one showing the number of families in which the chief wage-earner at the time of application was earning nothing. In more than two-thirds of the families the wages of the chief wage-earner had entirely ceased. If the 80 families in which there was no chief wage-earner at all are included, the proportion of families deprived of a regular breadwinner at the time of application was three-fourths of the whole number of families relieved. In the majority of cases distress was contemporaneous with the cessation of the earnings of the chief breadwinner, a fact which indicates prima facie, at least, that the

poverty of these poor is not chiefly a moral problem, but is chiefly an economic or financial problem.

The rates of wages of the 78 chief wage-earners whose wages at the time of application were normal are shown in the following table. This table, like all tables which give merely the rates of wages, shows very little about the living conditions of these families. It is not the wages that a person earns in a day or in a week, or even in a month, that throws light upon living conditions. In order to determine standards of living from earnings it is necessary to ascertain the earnings for a long period of time. An examination of the table produces at least one result, although a negative one; it causes little or no surprise that these families should have applied for charity even though the earnings at the time of application were flowing in regularly.

CHIEF WAGE-EARNERS PAID BY THE DAY, BY THE WEEK, AND BY THE MONTH, WHOSE EARNINGS WERE NORMAL AT THE TIME OF APPLICATION, BY REGULARITY OF EMPLOYMENT AND SIZE OF FAMILY.

Normal earnings.	Chief wage-earners.				Persons in family.
	Employment, regular.		Employment, irregular.		
	Male.	Female.	Male.	Female.	
WHITE.					
$0.20 per day		1			4
$1.00 per day	1				7
$1.00 per day			1		11
$1.50 per day	1				6
$1.50 per day	1				9
$1.65 per day	1				9
$2.00 per day	1				6
$1.25 per week		1			1
$1.35 per week		1			1
$2.00 per week		1			6
$2.50 per week		1			2
$3.00 per week	2				2
$3.00 per week		1			3
$3.00 per week	[a] 1				5
$3.50 per week		1			5
$4.00 per week		1			4
$4.00 per week	1				5
$4.00 per week	1				6
$5.00 per week	1				2
$5.00 per week	1				6
$5.00 per week			1		7
$5.25 per week	1				3
$6.50 per week	1				5
$9.00 per week		1			5
$9.00 per week	1				6
$9.00 per week	1				7
$9.00 per week	1				8
$10.00 per month			1		3
$15.00 per month	1				5
$20.00 per month		1			3
$20.00 per month		1			4
$25.00 per month		1			4
$25.00 per month		1			7
$30.00 per month [b]				1	4
$40.00 per month	1				10
$55.00 per month	1				6
$75.00 per month	1				6
Total	21	13	3	1	

Normal earnings.	Chief wage-earners.				Persons in family.
	Employment, regular.		Employment, irregular.		
	Male.	Female.	Male.	Female.	
NEGRO.					
$1.00 per day	1				5
$1.25 per day	1				5
$1.50 per day	1				6
$1.75 per day	[a] 1				2
$2.00 per day	1				3
$0.50 per week				1	2
$0.75 per week		1			4
$1.25 per week				1	4
$1.25 per week		1			5
$1.50 per week		[a] 1			3
$1.50 per week				1	5
$1.50 per week			1		8
$1.75 per week		1			4
$2.00 per week				1	2
$2.00 per week		2			4
$2.00 per week		[a] 1			8
$2.50 per week		1			4
$2.50 per week				1	5
$2.75 per week		1			5
$3.00 per week				1	3
$3.00 per week				1	4
$3.00 per week	1				5
$3.00 per week		1			7
$4.00 per week	1				5
$4.00 per week	1				8
$5.00 per week	[a] 1				7
$6.00 per week	1				6
$7.50 per week	1				5
$7.50 per week	1				9
$8.00 per week			1		10
$9.00 per week				1	3
$9.00 per week	1				7
$2.00 per month				1	4
$10.00 per month		1			5
$12.00 per month		[a] 1			2
$12.00 per month		2			3
$20.00 per month	1				4
$40.00 per month	1				8
Total	15	14	2	9	

[a] Not reported whether regular or irregular.

[b] $18.00 at time of application.

In the following table are shown the normal daily earnings of the chief wage-earner in those families where the normal rate of wage was in some form or other stated in the record, whether the normal rate was received at time of application or not. This table, like the one preceding it, fails to give a picture of the 269 families to which it relates. Before any comparison can be made, it is necessary to know how much money each family received in a year. Nevertheless the table has one feature that is worthy of notice. In over two-fifths of these families the chief wage-earner was a male working at a normal wage ranging from $1 to $2 per day, the wage most often not exceeding $1.50 a day. Nearly all of these wage-earners were day laborers—men with the pick and shovel. Some of them were working for the city, digging the sewers and mains, and sweeping the streets.

NORMAL DAILY EARNINGS OF CHIEF WAGE-EARNERS, BY SEX AND SIZE OF FAMILY.

Chief wage-earners in—				Persons in family.	Earnings per day. (a)	Chief wage-earners in—				Persons in family.	Earnings per day. (a)
White families.		Negro families.				White families.		Negro families.			
Male.	Female.	Male.	Female.			Male.	Female.	Male.	Female.		
.....	.....	.....	1	1	$0.08	2	.....	.....	2	2	$0.50
.....	.....	.....	1	2	.08	.....	2	.....	1	3	.50
.....	.....	.....	1	4	.08	.....	1	.....	5	4	.50
.....	.....	.....	1	4	.13	1	.....	1	1	5	.50
.....	.....	.....	1	1	.19	.....	.....	.....	1	7	.50
.....	1	.....	.....	4	.20	.....	.....	1	.....	2	.58
.....	1	.....	.....	1	.21	2	1	.....	.....	5	.58
.....	.....	.....	1	3	.21	.....	.....	1	1	6	.58
.....	.....	.....	1	4	.21	.....	.....	1	.....	3	.60
.....	.....	.....	1	5	.21	.....	.....	2	.....	6	.62
.....	1	.....	.....	1	.23	.....	1	.....	.....	3	.63
.....	.....	.....	1	1	.25	.....	.....	1	.....	1	.67
.....	.....	.....	1	2	.25	1	1	1	.....	2	.67
.....	.....	.....	3	3	.25	.....	1	.....	.....	3	.67
.....	.....	.....	1	4	.25	.....	1	.....	.....	4	.67
.....	.....	.....	1	5	.25	1	.....	1	.....	5	.67
.....	.....	.....	1	3	.29	1	.....	.....	.....	6	.67
.....	.....	.....	1	4	.29	.....	.....	1	.....	7	.67
.....	.....	.....	1	6	.29	.....	.....	1	.....	8	.67
.....	.....	1	.....	2	.31	.....	.....	1	.....	8	[b].67
.....	.....	.....	1	4	.31	.....	.....	.....	1	3	.75
.....	1	.....	.....	1	.33	.....	.....	1	.....	4	.75
.....	1	.....	1	2	.33	.....	1	.....	.....	3	.77
.....	.....	.....	1	3	.33	1	2	1	.....	4	.77
.....	.....	.....	3	4	.33	1	.....	.....	.....	2	.83
.....	2	.....	.....	6	.33	1	.....	.....	.....	3	.83
.....	.....	.....	1	8	.33	.....	.....	.....	1	4	.83
.....	.....	.....	1	3	.35	1	.....	.....	.....	5	.83
.....	1	.....	1	2	.38	1	.....	.....	.....	6	.83
1	.....	.....	2	3	.38	1	.....	1	.....	7	.83
.....	.....	.....	3	5	.38	1	.....	.....	.....	8	.83
.....	.....	.....	2	1	.42	1	.....	.....	.....	3	.88
.....	1	.....	1	2	.42	.....	1	.....	.....	4	.96
.....	.....	.....	1	3	.42	.....	1	.....	.....	7	.96
.....	.....	.....	1	4	.42	.....	1	3	.....	2	1.00
.....	.....	.....	1	5	.42	1	.....	1	.....	3	1.00
.....	.....	.....	2	2	.46	2	.....	2	.....	4	1.00
.....	.....	.....	2	3	.46	.....	.....	4	.....	5	1.00
.....	.....	.....	1	5	.46	.....	.....	3	.....	6	1.00
.....	.....	.....	1	6	.46	1	1	.....	.....	7	1.00

[a] Earnings per day shown in this column are computed in some cases by dividing weekly earnings by 6 and in other cases by dividing monthly earnings by 26.
[b] And board.

NORMAL DAILY EARNINGS OF CHIEF WAGE-EARNERS, BY SEX AND SIZE OF FAMILY—Concluded.

Chief wage-earners in—				Persons in family.	Earnings per day. (a)	Chief wage-earners in—				Persons in family.	Earnings per day. (a)
White families.		Negro families.				White families.		Negro families.			
Male.	Female.	Male.	Female.			Male.	Female.	Male.	Female.		
.....	.....	1	.....	2	$1.08	.....	.....	3	.....	2	$1.75
1	.....	.....	.....	5	1.08	1	.....	.....	.....	3	1.75
.....	.....	1	.....	5	1.10	.....	.....	1	.....	7	1.75
.....	1	.....	.....	4	1.15	1	.....	.....	.....	6	1.83
1	.....	.....	.....	5	1.15	1	.....	.....	.....	7	1.85
.....	.....	1	.....	6	1.16	1	.....	.....	.....	6	1.92
1	1	1	.....	5	1.17	.....	.....	1	.....	2	2.00
1	.....	.....	.....	6	1.17	1	.....	1	.....	3	2.00
1	.....	.....	.....	2	1.25	2	.....	.....	.....	5	2.00
.....	.....	1	.....	3	1.25	2	.....	1	.....	6	2.00
1	.....	.....	.....	4	1.25	1	.....	.....	.....	7	2.00
2	.....	3	.....	5	1.25	2	.....	1	.....	8	2.00
.....	.....	1	.....	6	1.25	1	.....	.....	.....	6	2.12
1	.....	1	.....	7	1.25	1	.....	.....	.....	7	2.31
1	.....	.....	.....	8	1.25	1	.....	.....	.....	10	2.31
.....	.....	1	.....	9	1.25	3	.....	.....	.....	2	2.50
1	.....	.....	.....	3	1.33	1	.....	.....	.....	4	2.50
.....	1	.....	.....	5	1.33	1	.....	.....	.....	5	2.50
.....	.....	1	.....	10	1.33	3	.....	1	.....	6	2.50
.....	.....	1	.....	3	1.35	.....	.....	1	.....	8	2.50
.....	.....	1	.....	4	1.35	1	.....	.....	.....	5	2.75
1	.....	.....	.....	1	1.50	1	.....	.....	.....	6	2.88
.....	.....	2	.....	2	1.50	2	.....	.....	.....	4	3.00
1	.....	3	.....	3	1.50	1	.....	.....	.....	5	3.00
5	.....	5	.....	4	1.50	1	.....	.....	.....	6	3.00
3	1	2	.....	5	1.50	1	.....	.....	.....	8	3.00
5	.....	3	1	6	1.50	.....	.....	1	.....	11	3.00
4	.....	2	.....	7	1.50	1	.....	.....	.....	3	3.20
3	.....	2	.....	8	1.50	1	.....	.....	.....	4	3.50
1	.....	1	.....	9	1.50	1	.....	.....	.....	5	3.50
.....	.....	3	.....	10	1.50	1	.....	.....	.....	2	4.00
1	.....	.....	.....	8	1.52	1	.....	.....	.....	4	4.00
1	.....	.....	.....	2	1.54	1	.....	.....	.....	5	4.00
.....	.....	1	.....	8	1.54	1	.....	.....	.....	6	4.00
1	.....	.....	.....	10	1.54	1	.....	.....	.....	7	4.00
1	.....	.....	.....	9	1.65	1	.....	.....	.....	4	4.17
1	.....	.....	.....	2	1.67	1	.....	.....	.....	4	5.00
1	.....	.....	.....	4	1.67	1	.....	.....	.....	5	5.00
1	.....	.....	.....	5	1.67	1	.....	.....	.....	10	5.00
1	.....	.....	.....	9	1.67						

[a] Earnings per day shown in this column are computed in some cases by dividing weekly earnings by 6 and in other cases by dividing monthly earnings by 26.

In 206 of the families there was evidence of a normal income additional to that derived from the labor of wage-earners. In many cases the reports told of assistance given by neighbors, in other cases the family could rely upon regular donations from a church, occasionally an absent child or a near relative would regularly pay the rent; upon the whole, however, assistance by relatives and kinsmen was rare—not so frequent perhaps as assistance by friends. In 43 families a monthly pension supplemented the regular earnings. These pensions ranged from $8 to $12 a month and were in a few cases practically the sole income of the recipient. With the exception of the pensions the element of additional income constituted but an insignificant factor in the finances of the families. In a great majority of cases when the regular earnings of members of the family were cut off practically everything was gone.

FAMILIES HAVING ADDITIONAL INCOME (OR HELP), AT NORMAL TIMES AND AT TIME OF APPLICATION.

Class.	At normal times.			At time of application.		
	White.	Negro.	Total.	White.	Negro.	Total.
Total families having some income in addition to earnings	91	115	206	99	124	223
Families (included in above) having pensions	29	14	43	29	14	43

KIND OF AID GIVEN.

The following table, showing the kind of aid received by these families, gives an insight into the pressing needs of the distressed poor:

FAMILIES RECEIVING AID IN 1905, BY KIND OF AID FIRST GIVEN.

Kind of aid first given.	Families.		
	White.	Negro.	Total.
Cash	1	1	2
Clothing	68	57	125
Clothing and food	5	13	18
Clothing and fuel	7	4	11
Clothing, food, and fuel	3	2	5
Food	175	270	445
Food and cash for rent	1	.....	1
Food and lodging	1	.....	1
Food and fuel	71	164	235
Food, fuel, and rent	1	.....	1
Fuel	98	204	302
Medicine	1	.....	1
Rent	8	4	12
Sanitarium treatment	1	.....	1
Supplies	.....	1	1
Transportation	9	8	17
Transportation and rent	1	.....	1
Not reported	1	3	4
Total	452	731	1,183

This table shows that lack of food was the most potent factor in driving people to seek charity. In 60 per cent of all the cases tabulated food constituted either the whole or a part of the donation. Next to food, fuel is most frequently sought by charity applicants. In nearly half the cases of relief given in 1905 fuel was one of the articles first given. Frequently recourse is made to charity because the usual supply of fuel is cut off by severe weather. Many very poor families are accustomed to get their fuel in a haphazard way, picking coal and cinders from public dumps and private ash heaps and gathering stray pieces of wood here and there.[a] The charity records bring out this fact. In 40 families it was the custom to gather fuel wherever it could be secured for nothing, and in a number of cases

[a] See Bulletin of the Bureau of Labor, No. 64, p. 610.

distress was due to the fact that cinders could not be picked from the dump because of the ice and snow.

After food and fuel, clothing is most frequently given. A word of explanation about the frequent giving of clothing is necessary. In a great many instances the clothing consisted of shoes given to children in order that bare feet might not prevent attendance at school. Cases happen where a family that can afford most things can not buy shoes for the children, and without shoes the children can not attend school. In such a case the charity organization comes to the relief of the family and gives the necessary shoes, even though there be no acute distress. This policy, with respect to the giving of shoes to enable children to attend school, materially increases the number of times clothing is given and adds to the charity roll quite a number of families who ordinarily would not belong there.

The number of times rent appears in the table by no means measures the distress that is connected with the arrears of rent. Next to the food problem the rent problem is unquestionably the one that presses most heavily upon the poor. The charity reports give many instances of arrears of rent. Notices of ejectment, costing the tenant $1.85 for service, are constantly appearing. Sometimes a letter from the landlord appears, as follows: "You have six days from the 25th of this month, which was last Tuesday, the day that judgment was rendered against you, to vacate the room you occupy. The constable will be there when the six days are out if you are not by that time removed." The records show that the constable knows how to fulfill his duty. The following are from the charity agents' reports:

"Yesterday woman and her children were set out of doors. All slept on the porch last night."

"Put out on street on a rainy day."

"Put out on street in spite of agent's protest."

"The rent not having been paid, the family were set out in the midst of a heavy snowstorm."

The records, however, do not always show the landlord to be cruel and hard-hearted. "I have given," says a landlord in a letter to the agent, "notice to Mrs. X to move. I wish it could be accomplished in such a way as to avoid the publicity which might hinder her from getting another house." In this note can be seen the real nature of the hardship of being turned out of doors for nonpayment of rent. Ejectment not only puts a family out on the street, but it also at the same time closes all doors against the family. No landlord wants a freshly ejected tenant. The poor know this and make every effort to avoid ejectment. In the archives of poverty nothing is sadder than the accounts of the efforts that are made to meet the rent.

"Said that she had to pay her last cent to-day on her rent and was now out of food and fuel and would have to wait until she has another week's work before she could buy food and fuel."

"Sold feather bed and pillows for enough to pay the rent."

"Said she was going to pawn her skirt to pay for rent."

"They had just gotten enough money for rent and if they could keep that without paying anything for groceries they would be able to pay up rent on the following day."

In the above excerpts can be discerned the policy of the poor in respect to rent; they will pay the rent money even if it takes every cent they have to do so and they afterwards have to go to charity for food or for fuel. The serious results of ejectment cause them to do this. This policy goes far in explaining why so few cases of assistance in rent appear in the table. There is another reason why the table does not show a larger number of rent cases: The charity organization does not make it a practice to pay the rent of applicants. Only in extreme cases will it undertake to furnish relief of this kind. An old woman on her deathbed had an ejectment notice served on her. There was nothing to do but pay the rent. In such cases the charity organization will meet the arrears, but in ordinary cases it does not undertake to do this.

Since the 12 cases of rent relief found in the table on page 893 give no idea of the magnitude of the rent problem in the lives of these families, a separate study bearing on the subject was made, and the results embodied in the following table. In this table is given the number of families in which financial pressure, due to rent, figured either directly or indirectly in the distress:

NUMBER OF WHITE AND NEGRO FAMILIES HAVING ARREARS OF RENT AND CHATTEL-MORTGAGE LOANS, BY DESCRIPTION OF FAMILIES.

Description of family.	Number of families having—					
	Arrears of rent.			Chattel-mortgage loans.		
	White.	Negro.	Total.	White.	Negro.	Total.
Husband and wife	5	5	10	.....	.....	.....
Husband, wife, and 1 child	10	9	19	.....	1	1
Husband, wife, and 2 children	18	2	20	1	.....	1
Husband, wife, and 3 children	14	4	18	2	.....	2
Husband, wife, and 4 children	18	7	25	3	2	5
Husband, wife, and 5 children	10	.....	10	.....	.....	.....
Husband, wife, and 6 children	6	7	13	1	1	2
Husband, wife, and 7 children	3	3	6	1	.....	1
Husband, wife, and 8 children	3	1	4	.....	.....	.....
Husband, wife, 2 children, and sister-in-law	1	.....	1	.....	.....	.....
Husband, wife, 3 children, and mother-in-law	.....	1	1	.....	.....	.....
Husband, wife, 3 children, son, wife, and child	.....	1	1	.....	.....	.....
Husband, wife, 6 children, and grandmother	1	.....	1	.....	.....	.....
Husband (separated) and 3 children	.....	1	1	.....	.....	.....
Widower	2	2	4	.....	.....	.....
Widower and 1 child	.....	1	1	.....	1	1
Widower and 4 children and grandmother	.....	1	1	.....	.....	.....
Widower and 6 children and woman	.....	1	1	.....	.....	.....
Man (single)	1	.....	1	.....	.....	.....
Man (single) and mother	1	.....	1	1	.....	1
Man, woman, and 5 illegitimate children	1	.....	1	1	.....	1
Widow	1	7	8	.....	.....	.....
Widow and 1 child	3	5	8	2	1	3
Widow and 2 children	3	3	6	.....	.....	.....
Widow and 3 children	.....	5	5	.....	.....	.....
Widow and 4 children	1	4	5	1	.....	1

NUMBER OF WHITE AND NEGRO FAMILIES HAVING ARREARS OF RENT AND CHATTEL-MORTGAGE LOANS, BY DESCRIPTION OF FAMILIES—Concluded.

Description of family.	Number of families having—					
	Arrears of rent.			Chattel-mortgage loans.		
	White.	Negro.	Total.	White.	Negro.	Total.
Widow and 5 children	1	3	4	.....	1	1
Widow and 6 children	.....	1	1	.....	.....	.....
Widow and 7 children	.....	1	1	.....	.....	.....
Widow and 4 children and dependent	1	.....	1	.....	.....	.....
Widow, 1 child, and mother	.....	1	1	.....	.....	.....
Wife (separated)	.....	1	1	.....	.....	.....
Wife (separated) and 1 child	4	1	5	.....	.....	.....
Wife (separated) and 2 children	2	4	6	1	2	3
Wife (separated) and 3 children	2	4	6	.....	.....	.....
Wife (separated) and 4 children	1	.....	1	1	.....	1
Wife (separated) and 5 children	1	3	4	.....	.....	.....
Wife (separated) and 6 children	1	.....	1	.....	.....	.....
Woman (single)	.....	3	3	.....	.....	.....
Woman (single) and niece	.....	1	1	.....	.....	.....
Woman (single) and 2 children	.....	.....	.....	.....	1	1
Woman (divorced)	.....	.....	.....	1	.....	1
Total	115	93	208	16	10	26

Of the 1,183 families, 208 at some time[a] and to some extent found arrears for rent associated with their appeal to charity. Nearly a third of the families thus distressed were fatherless; that is, they had as heads either widows or wives whose husbands had abandoned them.

Arrears of rent is the most frequent form of debt among those stricken by poverty, but there are other forms that are accompanied by acute distress. One kind of debt frequently met with is the unpaid grocery bill. This is sometimes quite as pressing as an unpaid rent bill. Another form of debt that presses sorely upon these families is the chattel-mortgage loan. This is a debt that constantly threatens to take the furniture out of the house. The charity organization helps the poor in many ways with their chattel-mortgage troubles, but they seldom pay the debt outright. This form of relief, therefore, does not appear in the table on page 893 showing kind of aid first given. In the preceding table, however, can be seen the extent to which the chattel mortgage entered into the poverty of these poor. In 26 families the exactions of the loan company were felt. The rates of interest were those usually charged in similar transactions. In one case there was a loan of $25 to be paid in 18 fortnightly payments of $2.50—$20 for the use of $25.00 for nine months. In another case a widow was behind two months in the payment of a loan. She had all the money except $1, but the company, which had sent a notice of foreclosure threatening seizure the following day, demanded payment in full. Every cent of the debt had to be paid or the furniture would

[a] This enumeration was not confined to the year 1905.

be taken. In this case the charity agent gave the needed dollar. The widow paid $4.40 for the use of $10 for four months.[a]

DELINQUENCIES OF CHARITY RECIPIENTS.

Statistics as to the moral conditions which prevailed in these families and the extent to which vice and crime were associated with the poverty of these charity recipients are shown in the following table:

NUMBER OF WHITE AND NEGRO FAMILIES FOR WHICH SPECIFIED MORAL DELINQUENCIES WERE REPORTED.

Moral delinquencies.	Families.		
	White.	Negro.	Total.
Brutality, by husband	.....	1	1
Cocaine habit, by husband	.....	1	1
Desertion, by husband	20	68	88
Desertion, by son-in-law	1	1	2
Desertion, by wife	.....	3	3
Desertion, by husband and wife	.....	1	1
Desertion and gambling, by husband	1	.....	1
Desertion and intemperance, by husband	6	3	9
Desertion and licentiousness, by husband	2	2	4
Desertion, by husband; licentiousness, by daughter	.....	1	1
Desertion, by husband; licentiousness, by wife	1	3	4
Desertion, by husband; lawlessness, by wife	.....	1	1
Dishonesty, by husband	1	.....	1
Dishonesty and licentiousness, by husband	2	.....	2
Dishonesty and lying, by husband	1	.....	1
Disorderly conduct, by husband	.....	1	1
Forgery, by husband	1	.....	1
Gambling, by husband	1	.....	1
Intemperance, by daughter	.....	1	1
Intemperance, by husband	67	23	90
Intemperance, by man	2	.....	2
Intemperance, by son	4	1	5
Intemperance, by wife	.....	1	1
Intemperance, by woman	2	.....	2
Intemperance, by husband and wife	6	1	7
Intemperance and criminality, by husband	.....	1	1
Intemperance and lawlessness, by husband	4	1	5
Intemperance and lawlessness, by son	1	1	2
Intemperance and licentiousness, by husband	2	1	3
Intemperance and lying, by husband	1	.....	1
Intemperance and neglect of family, by husband	3	.....	3
Intemperance and neglect of parents, by son	.....	1	1
Intemperance, by husband; morphine habit, by wife	1	.....	1
Intemperance, by husband and wife, desertion, by husband	1	.....	1
Intemperance and desertion, by husband; licentiousness, by wife	1	.....	1
Intemperance and lawlessness, by husband and son	1	.....	1
Lawlessness, by husband	.....	8	8
Lawlessness, by man	2	.....	2
Lawlessness, by son	.....	3	3
Lawlessness, by wife	.....	1	1
Lawlessness and licentiousness, by children	.....	1	1
Licentiousness, by child	.....	1	1
Licentiousness, by daughter	4	10	14
Licentiousness, by granddaughter	.....	1	1
Licentiousness, by husband	1	1	2
Licentiousness, by niece	.....	2	2
Licentiousness, by wife	6	9	15
Licentiousness, by woman	2	15	17
Licentiousness, by husband and wife	3	2	5
Licentiousness, by man and woman	1	.....	1
Licentiousness, by woman and daughter	.....	2	2
Licentiousness, by daughter; lawlessness, by son	.....	2	2
Licentiousness and mendicancy, by daughter	.....	1	1
Licentiousness, by wife; neglect, by husband	.....	1	1
Lying, by wife	.....	2	2
Mendicancy, by family	1	1	2

[a] For a full account of the conditions of borrowing among the poor, see Bulletin of the Bureau of Labor, No. 64, pp. 622–633.

NUMBER OF WHITE AND NEGRO FAMILIES FOR WHICH SPECIFIED MORAL DELINQUENCIES WERE REPORTED—Concluded.

Moral delinquencies.	Families.		
	White.	Negro.	Total.
Mendicancy, by husband	1	.....	1
Mendicaney, by wife	2	1	3
Mendicaney, by woman	1	.....	1
Mendicaney and intemperanee, by husband and wife	1	.....	1
Murder, by husband	.....	1	1
Neglect of parents, by ehildren	2	5	7
Neglect of parents, by daughter	.....	2	2
Neglect of parents, by son	2	9	11
Neglect, by mother	.....	1	1
Neglect, by son-in-law	.....	1	1
Neglect of mother, by children	.....	1	1
Neglect of mother, by son	.....	2	2
Neglect of family, by husband	7	10	17
Neglect of family, by husband; mendieaney, by family	1	.....	1
Thievery, by husband	1	1	2
Thievery, by sister	.....	1	1
Thievery, by son	3	2	5
Thievery, by wife	.....	1	1
Thievery and general immorality, by husband	.....	1	1
Total	174	220	394

In almost exactly two-thirds of the families there was no palpable delinquency whatever. This is to say, that a fairly decent standard of morals prevailed in a very large majority of the families. In almost exactly one-third of the families there was marked delinquency of some kind. Of the 394 families tainted by delinquency 174 were white and 220 colored, these numbers representing 38 per cent of the total white families and 30 per cent of the total colored families, respectively.

In charging delinquency against a family its whole charity record was taken into consideration, and in locating a fault it was sometimes necessary to go outside the economic group. In some cases it was exceedingly difficult to say whether there was delinquency or not. It was difficult to determine, for instance, in a case where the chief wage-earner—a widow—was arrested and incarcerated for stealing bread for her children whether there was delinquency. Because it was lawlessness it was decided that the woman was a delinquent. A man at the age of 59 married a young woman of 28. After the birth of several children there was a separation. Then the husband returned, another child was born, and there was another separation. This alternation of desertion and home-staying continued until the time of the investigation, when the husband, then at the age of 72, was a deserter and when there were seven children in the family. The husband was not charged with moral delinquency on account of the desertion, for the reason that at no time had the man been able to contribute much to the family support. In another very interesting case a man and a woman, who had never been legally joined in marriage, were living together and raising a family of children.

There seemed to be perfect loyalty, and the adulterous relation seemed to have no kind of effect upon the affairs of the household. Economically it was the same as if there had been a marriage certificate. The family was stamped of course with licentiousness, but the action of the couple contrasts favorably with the many cases where women with illegitimate children were abandoned. The facts bearing upon delinquency, besides being difficult to interpret, are also sometimes exceedingly difficult to ascertain. In one case, after a certain family had been scheduled as being without delinquency, the information was unearthed that the husband was a drunkard and for several years had been going on long sprees. During these years the charity agent had been patiently trying to learn the cause of the trouble, but her inquiries had been skillfully eluded.

The leading delinquencies as shown by the table are intemperance, desertion, licentiousness, neglect by natural supporters, lawlessness, thievery, and mendicancy. First among the delinquencies stands intemperance. In 128 families, more than 10 per cent of the whole number receiving charity and nearly one-third of all those in which delinquency was visible, intemperance was present. In the families afflicted by intemperance the husband was the delinquent in 114 cases. In not one family in a hundred is a drunken woman found. In 96 cases the intemperance was in white families and in 32 cases it was in colored families.

Next to intemperance stands the vice of desertion. In 144 cases there was wanton abandonment of the family, and in 137 of these cases the offender was the husband. In 102 cases the desertion occurred in colored families and in 42 cases in white families.

After intemperance and wanton abandonment the evil most apparent was licentiousness. Evidence of this delinquency was in many cases, of course, largely a matter of inference. Sometimes when the evidence was direct and clear it was still hard to brand the family with moral turpitude, as in the case of an old colored woman of 70 years who had never been married and who yet was the mother of children. Her error, however, was of another age and was committed in slavery times. The circumstance that most frequently supported the charge of licentiousness was the presence of illegitimate children. Of these there was an unusually large number—11 illegitimate white children and 68 illegitimate colored children. Of the 64 cases in which licentiousness is the principal charge women were the offenders in 61 cases. This disproportion between the sexes is due to the fact that the male offender was most frequently an outsider who could not be included in the enumeration. In 17 cases this vice was found in white families and in 47 cases in colored families.

Of the 43 cases of neglect by natural supporters shown in the table more than a third were chargeable to husbands and were therefore similar to cases of desertion. This neglect very often consisted in staying away from home for several days and nights at a time and spending whatever cash might be on hand. Sometimes the neglect took the form of intermittent desertion; the husband would go and come, supporting the family when at home and leaving it to shift for itself when away. Next to husbands, the greatest offenders in the way of neglect were grown sons. In 11 cases sons who were able to help their parents ungratefully withheld the sorely needed aid.

Mendicancy can not figure largely among delinquencies of charity recipients, for the reason that the charity organization withholds aid from mendicants. This evil, however, is one that the charity people have to deal with constantly, and now and then, as the table shows, a family in which there are beggars succeeds in securing doles. This is not surprising when the methods to which mendicants resort are considered. One family succeeded in exploiting fifteen different churches and organizations, the charity organization among the number. There were eight in the family, five being over 15 years of age, but nobody worked, not even the male head of the family. Another instance was that of an oily-tongued person who posed as a preacher and who received aid for several years before he was discovered to be a beggar and a fraud. In another case a mendicant family was holding membership in three different churches and passing under a different name in each church. The ruse was not discovered until the charity organization had been for some time a victim of the deception.

But more troublesome than mendicancy itself is a certain reliance upon charity, a certain inclination to pauperism, which crops out in many charity recipients. Such a spirit of dependence was visible in 69 families, 40 of which were white and 29 colored. The reliance upon charity here referred to did not quite assume the form of a positive delinquency. The dependence sometimes took on the aspect of faith, as in the case of an old man who, when asked why he did not go to the poorhouse, said that he relied on God to take care of him and keep him out of the poorhouse. When applying for charity it seemed to him that he was only falling in with a divine scheme. In some cases it is plain that the feeling of reliance is due to the unwise action of friends or of churches. "I fear the family has been too much petted by the church people" is the impression of one agent in respect to a family that was accustomed to haunt the charity office. Quite often the person put down as relying upon charity was an old colored woman who was used to getting help here and there from white people and who regarded the charity agent simply as one of her "white folks." A remarkable case of dependence was that of a woman who relied on an ex-slave to support her. The faithful domestic worked

only to keep her former mistress from want, and when the earnings were too scant for this it was the ex-slave and not the mistress that visited the charity office.

Farther removed from delinquency than reliance on charity is a certain perversity of pride which figures in these cases with sufficient frequency to warrant mention here. In at least a dozen cases the applicants went to the charity office because they were too stubborn or too proud to appeal to natural supporters who were able and willing to help them. "A rich brother would give aid," is the agent's note in one case, "but because she thinks he would give grudgingly she would rather take charity." In another case a woman applicant had relatives who would have helped her gladly. The agent wrote to the applicant suggesting that she appeal to her relatives for aid. The applicant refused, saying in the letter of reply: "It is very easy for you to advise me to do what Heaven and earth couldn't make you do if you were in my place."

In a very few cases the delinquency was so comprehensive and multifarious as almost to warrant its being classified as total depravity, but that classification was of course not practicable. In such cases poverty and delinquency are indissolubly united. The records in cases of this kind usually extend over many years—in one case over twenty years—and the account is a long story of crime, licentiousness, intemperance, and mendicancy.

CAUSES OF DISTRESS OF CHARITY RECIPIENTS.

Consideration is next given to the causes which operated to produce in more than a thousand families a distress so deep that relief could be found only in a charity office.

In characterizing the causes of poverty it is well to use only such terms as the poverty-stricken person himself would understand. In doing this the word "inefficiency" should rarely be used. A machine that does not fulfill the purpose for which it was constructed may be said to be inefficient and, by a metaphor, a man who does not do well the work for which he has been trained may be charged with inefficiency, but it is seldom that the charity seeker can justly be called inefficient. The conditions of life which surround the poverty-stricken class are incompatible with anything like efficiency. "It is the bitterest portion of the lot of the poor that they are deprived of the opportunity of learning to work well. To taunt them with that incapacity and to regard it as the cause of poverty is nothing else than a piece of blind insolence. Inefficiency is one of the worst and most degrading aspects of poverty; but to regard it as the

leading cause is an error fatal to a true understanding of the problem."[a]

The same reasons that dissuade from assigning "inefficiency" as a cause of poverty dissuade from assigning "ignorance" as a cause. It is true that large numbers of charity seekers are ignorant of the art of right living, and the poverty of these might be ascribed to "ignorance," meaning that they were ignorant of the art of right living, but such a classification would not throw much light on the subject of poverty. Nor would it tell the charity seeker any useful things about himself. If a man is told that his poverty is due to drunkenness, or licentiousness, or lawlessness, or mendicancy, he will understand and may respond morally to what is said, but if he is told that it is due to ignorance he will not, can not, have the faintest notion of what is meant. Ignorance, like inefficiency, is one of the ugly aspects of poverty, but it can not be usefully regarded as one of the causes of poverty.

There is a phase of ignorance that may sometimes be rightly characterized as a cause of poverty. This is illiteracy. Modern life demands a knowledge of reading and writing, and a person who is ignorant of these arts is often as seriously impeded in the race for a livelihood as one who has a lame foot. The matter of illiteracy was therefore not disregarded in this investigation. As far as the records gave an account of the literacy of a family the facts were carefully noted. But the account was in many instances unsatisfactory and incomplete, and taking them altogether the facts relating to illiteracy were not full enough to tell the whole story. A correct picture of the literacy of those families was desirable, but even if one had been obtained, the additional knowledge thereby furnished would not have influenced the analysis now being made, for it happens that in these charity cases illiteracy, pure and simple, figures hardly at all as a cause of poverty. In one case a boy could not get employment as a messenger because he could not read and write. In another case a delicate man could not get a clerkship in a store for the same reason. Here ignorance in the sense of illiteracy was unquestionably a cause contributing to the poverty. In neither case, however, did it happen to be a cause of such weight as to deserve notice in the schedules.

"Irregularity of employment" is another expression that has been avoided in the characterization of the causes of poverty, although this cause is at the bottom of so much distress that it might be justifiable to call irregularity of employment the "causing cause" of poverty. But such language is too broad to be useful. Industrial

[a] J. A. Hulson: Problems of Poverty, p. 167.

society, especially that segment of it wherein these charity recipients are comprised, is organized on the basis of irregularity of employment. Among these workers there is no certainty that employment of any kind, regular or irregular, will be secured, and even when regular employment has been secured, many things, like sickness, severe weather, accident, fire, flood, panic, dullness of trade, strikes, or lockouts intervene to make it irregular. To say, therefore, that a man's poverty is due to irregularity of employment is hardly more than to say that it is due to the adverse conditions which prevail in the industrial world.

But, while irregularity of employment has not been used as a convenient term in the enumeration of the causes of poverty, the subject has nevertheless received careful attention in this study. In every case examined this question was asked: Does the chief wage-earner of this family seem to have a steady job? In those cases where the employment seemed to be of a kind that usually continues right along without serious break, the employee was regarded as being regularly employed. In all other cases the employment was put down as irregular. The result is seen in the table on pages 886 and 887. Of the 1,051 cases in which it was possible to characterize the employment of the chief wage-earner as regular or irregular, 919 were irregular. That is to say, in about one family in eight the chief wage-earner could feel that he had steady work, while in seven-eighths of the cases the chief wage-earner was liable to loose his job at any moment. "The curse of the American workman," says Dr. T. S. Adams, "is irregular employment."[a] If this is true of the whole class of workmen, how distressingly true is it of the workmen among these charity recipients.

The expression "financial element" is used in this discussion as a comprehensive phrase referring to a certain restricted class of causes which operate to produce distress. At first thought "financial element" would seem to be at the bottom of every case of distress. In a certain sense this is true, but for the purpose of this analysis a case of distress can not be so easily disposed of. For instance, there was a man whose wages were $5 a day, whose services were in demand, and who worked quite regularly, but he squandered his money by drinking and gambling, and his wife and children were thrown upon charity. It would not be correct to ascribe this distress to a lack of money, and the case shows that there is a nonfinancial as well as a financial element which operates to produce distress. The financial element, as used here, includes one, or several, or all of the following causes: Insufficient earnings, lack of employment, sickness, accident, old age, and severe weather. All of these in the last analysis operate

[a] T. S. Adams: Labor Problems, p. 170.

like a financial cause in producing distress. In 28 of the families the "financial element" was not visible at all. In these families it was not possible to point to insufficient earnings, nor to lack of employment, nor to sickness, nor to accident, nor to old age, nor to severe weather, as contributing to the poverty; the financial element figured neither openly nor in disguise. Of the 28 families in which only the nonfinancial element appeared as the cause of distress 20 were white and 8 were colored.

IMMEDIATE CAUSES OF DISTRESS.

Usually a case of distress acute enough to drive a family to charity is complicated. The following is typical of many: "The husband has been out of work for two months; they are back in their rent and notice has been served and they are likely to be set out on the street. There is nothing in the house to eat, while the wife expects to be confined in a very short time." At first glance it appears that the cause of distress in this case can be expressed by a single phrase. Lack of employment would seem to account satisfactorily for the distress. If, however, the record went on to show that a prolonged spell of cold weather prevented the husband from following his usual vocation, an indirect or contributing cause, namely, severe weather, would have figured in the account. If further study of the record showed that the wife was an invalid with tuberculosis and that for years the family had been kept down by reason of her condition, still another fact would have to be reckoned with, and sickness might have to be set down as the underlying, permanent cause of the destitution.

This typical case, then, foreshadows three classes of causes, direct or immediate causes, indirect or contributing causes, and dominant or persistent causes.

Immediate causes are those catastrophies—the debauch of the father, the confinement of the mother, the sudden and unexpected loss of work, the visitation of death—which overtake the family. The immediate cause is the one that impinges directly upon the consciousness of the applicant and the one that seems to hurry him to the charity office. It is the cause which the applicant himself is apt to assign as a reason for making an appeal to charity. "What brings you here asking for aid?" inquires the charity agent of the applicant. In the answer to this question will usually be found what is here called the immediate cause.

The direct causes of distress in all the families are shown in the table which follows:

NUMBER OF WHITE AND OF NEGRO FAMILIES RECEIVING AID IN 1905, BY IMMEDIATE CAUSES OF DISTRESS.

Immediate cause of distress.	White.		Negro.		Total	
	Families.	Persons.	Families.	Persons.	Families.	Persons.
Accident	17	85	38	155	55	240
Blindness	.....	.....	4	15	4	15
Death in family	.....	.....	3	16	3	16
Desertion	5	21	7	24	12	45
Incarceration	6	16	7	22	13	38
Insufficiency of earnings	26	126	55	241	81	367
Intemperance	12	77	.....	.....	12	77
Lack of employment	196	[a] 821	201	[b] 831	397	1,652
Lack of employment and old age	.....	.....	1	3	1	3
Lameness	1	3	1	3	2	6
Loss by fire	2	8	3	9	5	17
Loss of horse	1	4	.....	.....	1	4
Loss of income from roomers	.....	.....	1	3	1	3
Loss of money	.....	.....	1	2	1	2
Neglect by natural supporters	4	18	7	26	11	44
Old age	9	11	40	53	49	64
Old age and blindness	.....	.....	1	2	1	2
Severe weather	2	10	4	12	6	22
Sickness	170	[c] 659	355	[d] 1,081	525	1,740
No good cause	1	1	2	7	3	8
Total	452	[e] 1,860	731	[f] 2,505	1,183	4,365

[a] Including 4 Negroes, members of white families.
[b] Not including 4 Negroes, members of white families.
[c] Including 5 Negroes, members of white families.
[d] Not including 5 Negroes, members of white families.
[e] Including 9 Negroes, members of white families.
[f] Not including 9 Negroes, members of white families.

Sickness easily leads the list. In nearly half the families that applied for aid for the first time in 1905 the distress was directly connected with some form of bodily ailment.([a]) There was almost every kind of disease which flesh is heir to, but the greatest distress was caused by rheumatism and tuberculosis, the latter leading by far all the other diseases.

Figures can not tell the complete story of the ravages made by sickness in these families. In one case the whole family was prostrate at one time. In another case a teamster regularly employed at fairly good wages by a great express company was brought to charity by a prolonged illness. In still another case where the regular wages of the husband was $60 a month the sum of $800 had been saved. Sickness came and remained for many months and before it departed every cent of the savings was wiped out, and the family

[a] The cases of sickness include 71 cases of childbirth. Confinement, physiologically considered, is not sickness, but its economic result is the same as that of sickness. In the records of some families confinement time is the only time when charity is resorted to. The aid given upon the occasion of confinement is quite frequently clothing for the new-born babe. "Found woman needed a few articles of clothing for the baby that was to be born," is the note of the agent in one case. "Would you be willing to see that the mother has an outfit for the baby? If you do not I fear the little thing will have to be wrapped up in rags," are the words of a letter written to the agent in respect to another case.

was reduced to charity. Good wages, thrift, and regularity of employment, all combined, availed not to save the family from the havoc of a long illness.

Next to sickness among the causes of immediate distress is the lack of employment, more than one-third of the families having sought relief for this cause. It will be understood that lack of employment is to be taken here as meaning an entirely different thing from irregularity of employment. The latter expression as employed in this article has been used to denote a certain unsteadiness in the nature of the man's job or a certain insecurity in his tenure of it. Lack of employment on the other hand refers to the man's definite inability to get work during a definite period of time whether his usual vocation is classed as regular or irregular. For example, a man whose occupation is that of a clerk in a store loses his position and before he can secure another place becomes an object of charity. Here the man's employment is classed as "regular" but the immediate cause of his distress is put down as "lack of employment."

The charity records are constantly referring to the evil resulting from lack of employment:

"X has been out of work nine weeks and has used up all he saved." In this case X was a sober man and a member of a union, with a wage of $3.50 per day—when he could get work.

"While the husband was at work his wages, together with those of his wife, were sufficient to support his family, but when the husband lost his job for only a week the family was thrown upon charity."

"The man earned $4 a day at structural ironwork, but a long-continued spell of bad weather exhausted the funds and brought the man to poverty."

"The father had tramped all over the city looking for work until his feet were sore."

In the last excerpt the reference to feet made sore by tramping in search for work calls attention to one of the most serious phases of the distress that is wrought by lack of employment. If a period of enforced idleness were a season of recuperation and rest there would be a good side to lack of employment. But enforced idleness does not bring recuperation and rest. The search for labor is much more fatiguing than labor itself. An applicant sitting in one of the charity offices waiting for the arrival of the agent related his experiences while trying to get work. He would rise at 5 o'clock in the morning and walk 3 or 4 miles to some distant point where he had heard work could be had. He went early so as to be ahead of others, and he walked because he could not afford to pay car fare. Disappointed in securing a job at the first place, he would tramp to another place miles away, only to meet with disappointment again. Then

would follow long journeys to other places. After a day consumed in useless tramping he would make his way home, exhausted in body and depressed in spirit. The next day would be a repetition of the day before, and every day it became more and more difficult to go home to his family without anything to give them. "It almost grieves a man to death," he said, "not to have something to give his wife and children." As the man told his story he drove home the truth that lack of employment means far more than simply a loss in dollars and cents; it means a drain upon the vital forces that can not be measured in terms of money.

Next to sickness and lack of employment in the list, but a long way behind both, stands insufficient wages as a direct cause of distress. Insufficient wages means that the rate of wages was so low that the family could not live upon the earnings, even though the full wage was being received at the time of the application. The preceding table shows that 81 families whose wage-earners were regularly employed were compelled to supplement their earnings by doles from the charity office.

In determining whether the wage was sufficient for subsistence or not, a calculation was made based upon the supposition that an adult male requires at least $1 per week for food (uncooked).[a] In estimating for rent in the calculation, a monthly sum ranging in amount from $5 to $8, according to the size of the family, was allowed. When these allowances for food and rent consumed all (or practically all) the earnings of the family visible at the time of the application, the immediate cause of the distress was determined to be insufficient wages. A glance at the earnings shown in the tables on pages 890 to 892 will show that the methods of determination here adopted would very frequently result in finding insufficient wages as the cause of the distress. But the conclusions embodied in the table on page 905 were not drawn from the preceding tables. In these tables account was taken only of the wages of the chief earner, whereas in the later table the earnings of all the members of the family were taken into account. In making the table on page 905, very frequently a family was regarded as receiving insufficient earnings, even though the exact amount of these earnings was not stated. Thus where the applicant was a widow with 6 small children and her earnings consisted only of what she made at the washtub, the cause of distress was put down as insufficient earnings, for the reason that the regular work of one woman at washing and ironing will not bring in enough to support a family of 7. When forming conclusions as to whether the wages received were sufficient or not, hard and fast rules were often found to be impracticable. Each case was

[a] See Bulletin of the Bureau of Labor, No. 64, p. 603. The consuming power of a family was estimated by the method indicated on page 602 of Bulletin 64.

studied in its entirety and judgment was based upon all the facts. A few illustrations will serve to show how this subject was treated in cases where wages were indefinitely stated:

1. A family of 8 persons. The rate of wages is not stated, but the records show that when it was a family of 6 persons the husband was earning $1.52 per day as a laborer and that this was not sufficient at times to keep them from charity. Although the rate of wages at the time of application in 1905 is not given, the occupation of the husband was in that year still that of a laborer, and since the family had increased to 8 persons there was no hesitation in ascribing the distress to insufficient earnings.

2. A family of 9 persons. The father is a waiter, the wife a laundress. A girl of 16 nurses and a boy of 15 earns a little now and then at jobbing. The young children go to school. When all the wage-earners are at work, there is no need for charity, but when the wages of a single member of the family are cut off or interfered with recourse to charity had to be made. For the reason that it was only normal and inevitable that some untoward events should arise, the destitution was put down to insufficient wages. Where the wages are so low that the least ripple of adversity brings a family to poverty, wages may be fairly regarded as insufficient.

3. A case extending over many years. An aged couple work and make what they can. Their work was irregular and sometimes they earned so little that they were compelled to visit the charity office. Here not insufficient earnings but old age was regarded as the direct cause.

4. A family of two—man and wife—both quite old. The man served as a watchman at $5 per week, a sum not sufficient to keep himself and wife from charity. The man worked regularly and performed his work well. Not old age, but insufficient wages was here assigned as the direct cause.

5. A family of 9 persons. Husband's salary $9 per week. Oldest boy clerks at $3 per week, but his earnings are not regular. Agent states that "man has regular work, but family is so large that it is not sufficient for their needs." The distress in this case was determined to be due to insufficient wages, the conclusion being based in part upon the comment of the agent.

In 55 families the immediate cause of distress was accident. This cause in its economic results is quite like that of sickness, and viewed in this light the cases of accident might very properly have been classified with those of sickness. One phase, however, of the subject of accidents among the poor requires special notice—the phase bearing upon the question of the employer's liability. As the cases are studied one is impressed with the justness of liberal liability or com-

pensation laws for workmen. A few of the agents' notes descriptive of accidents may suffice to show present conditions:

1. A man was working, helping in the building of a house. While wheeling a wheelbarrow he stepped aside to let a fellow-workman pass. In passing he was jostled and was caused to lose his balance. He fell and was made a permanent cripple. He received no compensation.

2. A man was working for a large transportation company, handling boxes. At 3 p. m. he hurt his foot severely. Nothing was allowed in the way of liability, and the statement is made that the man was paid for only three-fourths of a day's work.

3. A man was injured by an explosion while working on a sewer for the city. In this case a small indemnity was allowed, but the authorities explicitly stated that the city was under no obligations to give anything, although the disability caused by the accident was permanent.

4. A man was working at a freight depot and while in the performance of his labors met with an accident which cut off his earnings for several weeks, and which sent him to charity. No compensation.

5. A man was caught in a rope and crushed before the machinery could be stopped. The accident, it was alleged, was due to the fact that there were not proper appliances of safety to the machine. No compensation.

Fifth among the causes that urged these families to seek the charity office was old age. In 49 families the applicant's earning power had been exhausted by the weight of years. "I am worn out," was the way one applicant, a physician of four score and seven, expressed it. In many of the old-age cases there is a record of but one visit to the charity office. This often meant that the applicant had found a permanent home either in the grave or in the poorhouse.

The five leading direct causes that operate to throw the poor upon charity have been pointed out. It is seen that sickness, lack of employment, insufficient wages, accident, and old age constitute nearly 94 per cent of all the direct causes. This is to say that in nearly nineteen cases out of twenty the impelling cause of the application is directly referable to a financial factor; either the rate of wage is too low for subsistence, or there is a stoppage of income due to a lack of employment, to sickness, to accident, or to old age.

Most of the remaining direct causes are so remotely connected with the question of wages that they may be regarded as nonfinancial. Sudden desertion may plunge a family into temporary distress even when the deserter is receiving high wages. A spree will often cause a resort to charity even though the husband is in receipt of a fairly good income. A man whose family is subsisting upon charity may be lying in prison for the commission of a crime, yet his incarceration, the direct cause of his family's distress, may have had nothing whatever to do with the question of wages. The nonfinancial direct

causes, however, form but an insignificant portion of all. In only about one case out of twenty can it be said that a financial element did not figure as an immediate cause of distress.

CONTRIBUTING OR INDIRECT CAUSES OF DISTRESS.

Usually the story of a charity case is only begun when the direct cause has been stated. In the following table it is shown that in 854 of the families a contributing cause might be added to the cause that appears on the surface. In 329 families the direct cause told the whole story. The case was simply due to a temporary loss of employment, to a debauch, to a spell of cold weather, or to some other isolated and perhaps nonrecurring circumstance.

NUMBER OF WHITE AND OF NEGRO FAMILIES RECEIVING AID IN 1905, BY CONTRIBUTING CAUSES OF DISTRESS.

Contributing cause.	White.		Negro.		Total.	
	Families.	Persons.	Families.	Persons.	Families.	Persons.
Accident	1	4	5	18	6	22
Affliction of children	.....	.....	1	3	1	3
Blindness	1	2	5	15	6	17
Blindness (partial)	1	1	2	8	3	9
Death in family	.....	.....	3	17	3	17
Deformity	.....	.....	1	1	1	1
Desertion	26	95	61	212	87	307
Disability	1	3	.....	.....	1	3
Dullness of trade	1	3	.....	.....	1	3
Feeble-mindedness	4	11	2	12	6	23
Imbecility	.....	.....	1	4	1	4
Incarceration of husband	.....	.....	3	16	3	16
Insanity	3	4	.....	.....	3	4
Insufficient earnings	15	79	37	211	52	290
Insufficient earnings and neglect	1	8	.....	.....	1	8
Insufficient earnings and shiftlessness	1	9	.....	.....	1	9
Intemperance	50	[a] 251	17	[b] 102	67	353
Intemperance and old age	1	4	.....	.....	1	4
Lack of employment	12	65	29	97	41	162
Lameness	.....	.....	4	10	4	10
Lawlessness	1	1	.....	.....	1	1
Lawlessness and licentiousness	.....	.....	2	10	2	10
Licentiousness	4	9	20	63	24	72
Loss of money	1	3	1	4	2	7
Maltreatment	1	1	.....	.....	1	1
Mendicancy	3	15	2	7	5	22
Morphine habit	1	3	.....	.....	1	3
Neglect by natural supporters	8	36	24	58	32	94
Old age	36	60	76	140	112	200
Old age and lawlessness	1	1	.....	.....	1	1
Old age and neglect	.....	.....	1	2	1	2
Old age and sickness	.....	.....	1	3	1	3
Severe weather	22	106	57	188	79	294
Severe weather and old age	.....	.....	2	4	2	4
Shiftlessness	37	146	18	72	55	218
Shiftlessness and intemperance	.....	.....	1	9	1	9
Shiftlessness and neglect	1	6	.....	.....	1	6
Shiftlessness and thievery	.....	.....	1	2	1	2
Sickness	90	[c] 404	146	[d] 601	236	1,005
Sickness and intemperance	1	7	2	12	3	19
Sickness and neglect	.....	.....	1	2	1	2
Sickness and severe weather	.....	.....	1	8	1	8
Thievery	1	2	1	4	2	6
None apparent	126	521	203	590	329	1,111
	452	[e] 1,860	731	[f] 2,505	1,183	4,365

[a] Including 2 Negroes, members of white families.
[b] Not including 2 Negroes, members of white families.
[c] Including 7 Negroes, members of white families.
[d] Not including 7 Negroes, members of white families
[e] Including 9 Negroes, members of white families.
[f] Not including 9 Negroes, members of white families.

The list of contributing causes differs essentially from that of immediate causes. Sickness, insufficient earnings, lack of employment, and accident figure very much less than they did in the direct causes, while desertion, intemperance, and neglect by natural supporters figure very much more. New causes, too, appear. Among these are licentiousness, shiftlessness, mendicancy, and thievery. Plainly none of these could very well appear as direct causes. The applicant could hardly say that he made the appeal for charity because he was a beggar or because he was a thief.

A broad survey of the surface causes of distress showed that in a vast majority of cases the trouble was at bottom due to financial adversity. A broad survey of the contributing causes shows that the undercurrent of distress is strongly colored with moral delinquency. Desertion, intemperance, licentiousness, neglect by natural supporters, mendicancy, and thievery constitute about 25 per cent of all these contributing forces. The subject of contributing causes is therefore closely interwoven with the subject of moral delinquencies.

Among the contributing causes is one which has not been set down as a delinquency but which in quality closely approaches delinquency, namely, shiftlessness. In 55 families this has been given as the contributing cause. Shiftlessness is here regarded as consisting in a failure to make the best of opportunities. It is not exactly laziness. Laziness does not appear in any of the tables as a cause of distress, for the reason that the charity agents will not give to lazy people. If the wage-earner is suspected of being lazy a "work test" is applied. When the industry of a man is a question of doubt he is sent to the municipal workhouse where he can earn some money at sawing wood. A woman suspected of being lazy is given an opportunity to earn something by sweeping or cleaning or scrubbing. If the applicant will do the work provided for him he is not regarded as being lazy. If he will not do the work he is put down as lazy and relief it withheld. Thus lazy applicants are not enrolled among the recipients and, theoretically, laziness is not discoverable in the records.

Because shiftlessness is not downright laziness it has not been set down in this study among the moral delinquencies, the class in which laziness undoubtedly belongs. But shiftlessness is very similar to laziness. For instance, a family comes from the country to live in the city. It can not stir itself to meet the demands of city life. There are girls in the family old enough to work, but they shrink from work because they have not been accustomed to earn a living and are unable to adjust their notions to urban conditions. Positions are secured for them, but they work in a half-hearted way and soon find themselves out of employment. The wages of the father are insufficient to feed all the mouths, and the family finds itself in distress. In the records of such families there is an habitual failure

to take hold and do the best that can be done, and where such failure is evident it has been characterized as shiftlessness.

One other cause contributing greatly to the poverty of these families must receive notice here. This is severe weather. In 79 families nature itself operated to produce distress. "Please be kind enough," said one applicant in a note written to the agent, "to send me some groceries and fuel, as I am very much in need. It is very hard to get on now with all this family, and my husband has not been working this cold weather when the ground is frozen. Remember me, please, and God will remember you." Lack of employment was put down in this case as the direct cause, but a cause almost as direct was severe weather. Some of the agents' notes show the ways in which the cold weather contributes to poverty:

"The family was in need of fuel, as they were unable to pick up any cinders on account of snow."

"It was simply impossible to get out and do work, there was so much snow on the ground."

"He (a blind man) couldn't stand on the street and sell shoe strings and peanuts, it was so cold."

"Impossible to do her washing, as the pipes and hydrants are frozen and she has to walk three squares for water."

"He (a ragpicker) can not work in the ice and snow."

The connection between severe weather and poverty in Washington is brought out in the following table. It is found that in nearly three-fourths of the cases aid was given for the first time in the months of December, January, and February, whether the first aid given for the year 1905 or the first recorded aid for any year is considered.

NUMBER OF WHITE AND OF NEGRO FAMILIES RECEIVING AID IN 1905, BY MONTHS IN WHICH THE FIRST AID FOR THAT YEAR WAS GIVEN.

Race.	Families to which first relief was given in the month of—													Total.
	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Not reported.	
White	134	102	36	13	11	11	15	16	12	11	27	64	.....	452
Negro	266	248	41	20	8	9	5	12	6	10	26	79	1	731
Total	400	350	77	33	19	20	20	28	18	21	53	143	1	1,183

NUMBER OF WHITE AND OF NEGRO FAMILIES RECEIVING AID IN 1905, BY MONTHS IN WHICH THE FIRST RECORDED AID FOR ANY YEAR WAS GIVEN.

Race.	Families to which first relief was given in the month of—													Total.
	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Not reported.	
White	100	86	47	15	8	13	14	14	12	15	34	93	1	452
Negro	223	223	49	10	11	10	5	9	6	12	36	136	1	731
Total	323	309	96	25	19	23	19	23	18	27	70	229	2	1,183

PERSISTENT CAUSES OF DISTRESS.

When determining what was the underlying or persistent cause or causes of a family's distress it was found necessary to reckon with a time element. In the case of a family where the records showed only one application for aid, or where the distress continued for only a short period of time, the dominant or persistent cause was of course not discernible. The records revealed a persistent cause only when the charity history extended through several years. When looking for the persistent cause, therefore, it became necessary to confine the search to those families whose charity career was of considerable duration.

In the following table it is seen that in 683 cases, for which reports were made as to the year in which relief was first given, the record went back of 1905. In 307 cases the family had been upon charity for five years or more; in 56 cases for ten years or more; in 13 cases for fifteen years or more, and in 3 cases for twenty years or more. In one case the year was not reported.

NUMBER OF WHITE AND OF NEGRO FAMILIES RECEIVING AID IN 1905, BY YEAR IN WHICH AID WAS FIRST RECEIVED.

Race.	Number of families receiving relief in 1905.	Families receiving relief in 1905 who were first given relief in—											
		1905.	1904.	1903.	1902.	1901.	1900.	1899.	1898.	1897.	1896.	1895.	1894.
White	452	183	72	41	20	16	11	16	24	18	23	12	5
Colored	731	316	98	63	46	20	21	32	28	39	39	6	9
Total	1,183	499	170	104	66	36	32	48	52	57	62	18	14

Race.	Families receiving relief in 1905 who were first given relief in—											
	1893.	1892.	1891.	1890.	1889.	1888.	1887.	1886.	1885.	1884.	1883.	Year not reported.
White	3	1	1	1	.....	1	.....	1	.....	1	1	1
Colored	5	1	.....	1	1	1	2	2	1	.....	.....	.....
Total	8	2	1	2	1	2	2	3	1	1	1	1

It was found convenient to classify the cases as temporary, intermittent, or permanent. When it is said that a case is temporary, it is meant that the records show no occasion of distress previous to the first application in 1905 and no further recourse to the Associated Charities for aid after the distress of that year was relieved. This does not mean, however, that in a temporary case there was only one act of relief, for many cases designated as temporary involved records

extending over several months and showed that numerous doles were given. They were put down as temporary because they covered one definite season of distress and that not a very long one. Nor must it be thought that because a case was classified as temporary that the family was no longer a recipient of charity. In some cases temporary relief marked only a step on the road to the poorhouse. More often, however, it marked only a short period of misfortune and one that was safely tided over. A tailor with his wife and two small children drifted to Washington to search for work. Employment was not speedily found and the funds were exhausted. The wife applied to charity. Correspondence brought out the fact that the man's record was excellent. A former employer wrote that the applicant was a first-class workman, upright, sober, and anxious to work. The charity people helped him a little with provisions and secured him suitable employment, and that was the beginning and the end of his experience with charity. In the temporary case we sometimes get a glimpse of a family at the lowest ebb of its fortunes—just when it is in the trough of adversity. For example, a husband works at $5 a week while his wife earns what she can at the washtub. The combined earnings do not meet the demands of the family, and charity is sought. But at the very time of distress two boys large enough to work begin to earn something, and the family makes no further appeal for aid. Sometimes the temporary case marks simply a sharp short crisis in domestic affairs. A chief wage-earner deserts his family, leaving it penniless. At first there is nothing to do but to go to the charity office. When new adjustments have been made, however, and the wife and children have found employment, no further appeal for aid is made.

The immediate and contributing causes of distress in temporary cases are set forth in the following tables. It is seen that of all the charity cases more than one-third (415) mark only a fleeting period of adversity. The tables show, too, that the immediate causes of these temporary appeals to charity are mainly sickness and lack of employment, the distress in more than three-fourths of the cases being due to these two causes alone. Among the contributing causes of the temporary cases sickness still holds the lead, although desertion, intemperance, and licentiousness are much more conspicuous among the contributing than among the direct causes of temporary distress.

NUMBER OF WHITE AND OF NEGRO FAMILIES RECEIVING AID FOR TEMPORARY DISTRESS IN 1905, BY IMMEDIATE CAUSES OF DISTRESS.

Immediate cause.	White.		Negro.		Total.	
	Families.	Persons.	Families.	Persons.	Families.	Persons.
Accident	2	8	3	3	5	11
Accident to husband	4	20	8	31	12	51
Accident to wife	.....	.....	3	7	3	7
Desertion by husband	4	18	4	12	8	30
Incarceration	1	1	.....	.....	1	1
Incarceration of husband	1	2	2	2	3	4
Incarceration of widow	.....	.....	1	4	1	4
Insufficient earnings	7	30	16	82	23	112
Intemperance of husband	1	5	.....	.....	1	5
Lack of employment	60	229	80	279	140	508
Lameness of wife	.....	.....	1	3	1	3
Loss by fire	2	8	3	9	5	17
Loss of horse	1	4	.....	.....	1	4
Loss of money	.....	.....	1	2	1	2
Neglect by husband	1	6	2	11	3	17
Neglect of family by husband	.....	.....	1	3	1	3
Old age	.....	.....	9	10	9	10
Old age, blindness	.....	.....	1	2	1	2
Severe weather	.....	.....	2	8	2	8
Sickness	19	21	38	41	57	62
Sickness of child, pneumonia	.....	.....	1	7	1	7
Sickness of children	2	10	1	7	3	17
Sickness of daughter	1	6	3	7	4	13
Sickness of grandchild	.....	.....	1	5	1	5
Sickness of husband	20	96	35	118	55	214
Sickness of husband and wife	1	4	1	5	2	9
Sickness of mother	.....	.....	1	3	1	3
Sickness of mother, heart disease	.....	.....	1	4	1	4
Sickness of son, tuberculosis	.....	.....	1	7	1	7
Sickness of sons	.....	.....	2	6	2	6
Sickness of wife	8	26	51	155	59	181
Sickness of wife, la grippe	.....	.....	1	2	1	2
Sickness of wife, pneumonia	.....	.....	1	3	1	3
Sickness of woman	1	2	3	10	4	12
Sickness of woman, tonsilitis	.....	.....	1	3	1	3
Total	136	496	279	851	415	1,347

NUMBER OF WHITE AND OF NEGRO FAMILIES RECEIVING AID FOR TEMPORARY DISTRESS IN 1905, BY CONTRIBUTING CAUSES OF DISTRESS.

Contributing cause.	White.		Negro.		Total.	
	Families.	Persons.	Families.	Persons.	Families.	Persons.
Accident	.....	.....	1	1	1	1
Accident to husband	.....	.....	2	9	2	9
Affliction of children	.....	.....	1	3	1	3
Blindness of husband	1	2	1	2	2	4
Childbirth	.....	.....	1	3	1	3
Death in family	.....	.....	1	6	1	6
Deformity of face	.....	.....	1	1	1	1
Desertion	.....	.....	3	7	3	7
Desertion by husband	4	15	15	49	19	64
Desertion by son-in-law	1	6	.....	.....	1	6
Disability of wife	1	3	.....	.....	1	3
Feeble-mindedness	1	1	.....	.....	1	1
Insufficiency of earnings	3	11	12	60	15	71
Intemperance	4	16	.....	.....	4	16
Intemperance and old age	1	4	.....	.....	1	4
Intemperance of husband	6	26	3	22	9	48
Lack of employment	2	7	5	13	7	20
Lack of employment of daughter	.....	.....	1	3	1	3
Lack of employment of wife	1	4	1	3	2	7
Lameness of husband	.....	.....	1	3	1	3
Lameness of sons	.....	.....	1	3	1	3
Lawlessness	1	1	.....	.....	1	1
Licentiousness	1	1	7	17	8	18
Licentiousness of daughter	.....	.....	2	8	2	8
Licentiousness of wife	.....	.....	1	2	1	2
Licentiousness of woman	1	2	.....	.....	1	2

NUMBER OF WHITE AND OF NEGRO FAMILIES RECEIVING AID FOR TEMPORARY DISTRESS IN 1905, BY CONTRIBUTING CAUSES OF DISTRESS—Concluded.

Contributing cause.	White.		Negro.		Total.	
	Families.	Persons.	Families.	Persons.	Families.	Persons.
Loss of money	1	3	1	4	2	7
Maltreatment of employer	1	1	.....	.....	1	1
Morphine habit of wife	1	3	.....	.....	1	3
Neglect by children	2	10	8	15	10	25
Neglect by husband	1	5	3	9	4	14
Old age	6	12	17	30	23	42
Old age and lawlessness	1	1	.....	.....	1	1
Old age of mother	.....	.....	2	8	2	8
Partial blindness of daughter	.....	.....	1	5	1	5
Partial blindness of wife	.....	.....	1	3	1	3
Severe weather	8	36	19	47	27	83
Shiftlessness	4	13	4	15	8	28
Shiftlessness and intemperance	.....	.....	1	9	1	9
Shiftlessness of sons	1	3	.....	.....	1	3
Sickness	8	21	3	9	11	30
Sickness and intemperance	.....	.....	1	6	1	6
Sickness and severe weather	.....	.....	1	8	1	8
Sickness of aunt	.....	.....	1	5	1	5
Sickness of child	1	3	.....	.....	1	3
Sickness of daughter	.....	.....	6	18	6	18
Sickness of husband	1	4	4	13	5	17
Sickness of mother	.....	.....	1	5	1	5
Sickness of son	1	5	5	21	6	26
Sickness of wife	15	74	28	100	43	174
Sickness of wife and neglect by son	.....	.....	1	2	1	2
None apparent	55	202	107	293	162	495
Not reported	1	1	4	11	5	12
Total	136	496	279	851	415	1,347

The intermittent case is where the appeal for aid is made only at intervals, sometimes of long and sometimes of short duration. In many a family prosperity alternates with adversity. For example, a large family is mentioned, which, in its whole career, has enjoyed much of prosperity, but has not been able altogether to keep its name from the charity roll. In 1902 a cold snap drove it to the charity office. In 1904 the husband lost his job for several weeks and appeal for aid had to be made again. In 1905 a prolonged spell of sickness caused a third appeal to be made. The family tried hard to keep its head above water, but once in a long while it was unable to do so unaided. Sometimes an intermittent case shows a strange regularity in the recurrence of the date of application. In one case application was made and aid was given January 6, 1904, January 12, 1905, January 12, 1906, January 17, 1907. In another family aid was given January 20, 1905, February 21, 1906, February 5, 1907. In these cases coal was given each time, and the periodicity of the distress gave rise to a suspicion that the applicants were something of frauds, and that the charity office was visited merely because experience had taught that at about a certain time in the year a little fuel could be secured. Sometimes, in the intermittency of the distress, there can be read the varying fortunes of the family. A widow was left in 1892 with 7 children, the ages of the children being respectively 15, 13, 10, 7, 6, 5, 3. During the years 1892, 1893, 1894, and 1895 her applica-

tions for relief were frequent. In 1896 they became less frequent and by 1899 they had ceased, not to begin again until 1905, when the sickness and death of one child and the loss of the wages of another brought the family again to charity. In this case it was plain that the applications for charity decreased in number as the children grew older and thus made an increase in the labor resources of the family. Frequently the charity record ends altogether when the children get large enough to bring in some money.

All cases that were neither temporary nor intermittent were classified as permanent. A permanent case differs from an intermittent case only in the continuity of the relief. Where aid was given right along, week after week for months and years, without serious break, the case was designated as permanent.

Where the relief was either permanent or intermittent, some dominant or persistent cause was usually discoverable. In the following table, where the persistent causes in both permanent and intermittent cases are given, it is seen that in 768 cases, or in nearly two-thirds of all, it was possible to assign a persistent or underlying cause of the poverty.

NUMBER OF FAMILIES RECEIVING PERMANENT OR INTERMITTENT AID IN 1905, BY PERSISTENT CAUSES OF DISTRESS.

Persistent cause	Permanent aid.		Intermittent aid.	
	Families.	Persons.	Families.	Persons.
Accident	2	3	4	16
Accident and sickness	.....	.....	1	8
Blindness	5	12	1	4
Criminality	1	10	1	2
Criminality and shiftlessness	2	4	.....	.....
Desertion	9	38	54	194
Disability	3	11	4	15
Dishonesty and licentiousness	1	5	.....	.....
Incarceration of husband	.....	.....	3	16
Injured arm	.....	.....	1	1
Insanity	1	2	.....	.....
Insufficient wages	7	33	42	244
Insufficient wages and desertion	.....	.....	1	4
Insufficient wages and intemperance	1	9	1	8
Insufficient wages and licentiousness	1	4	1	5
Insufficient wages and mendicancy	1	9	.....	.....
Insufficient wages and neglect	1	8	.....	.....
Insufficient wages and old age	1	2	1	2
Insufficient wages and shiftlessness	1	9	.....	.....
Insufficient wages and sickness	9	51	10	52
Intemperance	9	53	46	252
Intemperance and lack of employment	.....	.....	7	46
Intemperance and neglect	.....	.....	1	3
Intemperance and lawlessness	.....	.....	1	3
Intemperance and old age	2	5	1	1
Intemperance and shiftlessness	2	10	2	6
Intemperance and sickness	.....	.....	5	28
Lack of employment	3	13	47	226
Lack of employment and disability	.....	.....	1	5
Lack of employment and sickness	3	18	43	216
Lameness	1	1	.....	.....
Licentiousness	10	38	2	5
Licentiousness and desertion	.....	.....	1	3
Lunacy	.....	.....	1	1

NUMBER OF FAMILIES RECEIVING PERMANENT OR INTERMITTENT AID IN 1905, BY PERSISTENT CAUSES OF DISTRESS—Concluded.

Persistent cause.	Permanent aid.		Intermittent aid.	
	Families.	Persons.	Families.	Persons.
Mendicancy	3	18	1	3
Mental weakness	.....	.....	1	6
Neglect by natural supporters	2	6	10	43
Neglect and desertion	.....	.....	1	4
Not discoverable	.....	.....	3	13
Old age	37	50	64	113
Old age and mendicancy	1	2	.....	.....
Old age and neglect by natural supporters	2	4	.....	.....
Old age and shiftlessness	3	6	.....	.....
Shiftlessness	19	80	63	262
Shiftlessness and desertion	.....	.....	1	5
Shiftlessness and feeble-mindedness	1	2	.....	.....
Shiftlessness and lack of employment	.....	.....	2	19
Shiftlessness and lawlessness	.....	.....	2	9
Shiftlessness and licentiousness	1	4	.....	.....
Shiftlessness and neglect by natural supporters	.....	.....	1	6
Sickness	59	238	88	287
Sickness and desertion	3	8	2	8
Sickness and neglect	.....	.....	1	4
Sickness and old age	10	19	18	47
Sickness and shiftlessness	2	10	4	16
Thievery	.....	.....	1	4
Unbalanced mind	1	1	1	1
No good cause shown	.....	.....	1	2
Total	220	796	548	2,218

In this list of deep-seated, persistent causes we find the non-financial or moral element figuring as it has figured in no previous comparison. It is true that sickness leads, as always, and lack of employment is responsible for much, but shiftlessness, desertion, intemperance, and licentiousness here answer for much more than has elsewhere been charged against them. As direct impelling causes of distress these moral, or as we might very well say, immoral, elements prevailed in hardly 5 per cent of all the cases; as contributory causes they prevailed in about 25 per cent of all the cases; but as the underlying cause of prolonged distress they prevail in a third of all the cases. As knowledge of a case becomes more comprehensive the greater does the relative importance of the moral element appear. A consideration, then, of the deeply seated causes of the poverty of these 768 families shows that in the final analysis the distress was due in one-third of the cases to moral elements, and in two-thirds of the cases to financial elements.[a] The poverty of charity recipients would therefore seem to present a problem that is something less than one-third moral and something more than two-thirds economic. This at least is the conclusion drawn from the charity records in Washington.

[a] In 49 cases the persistent cause was of a mixed nature containing both the financial and the moral elements. These were excluded in the above calculation.

SUMMARY.

The results of the study may be summarized as follows:

Material aid, consisting of money, food, and clothing, was given in 1905 to 1,256 families in all. The charity records of 1,183 of these families were taken as the basis of this study. The number of persons in these 1,183 families was 4,365. These recipients constitute the floating, unattached, isolated poor of the city. This isolation is seen in the fact that of the 1,775 wage-earners among the recipients only 23 of the 81 who reported on the subject stated that they belonged to labor organizations, and in only 40 families was there evidence of membership in fraternal or beneficial societies.

The average size of the charity family is 3.7 persons, as against an average of 4.9 persons of the District of Columbia. Excluding that large class of charity families consisting of only 1 person or only 2 persons, the average of the charity family is brought up to 5, a normal average. The charity family therefore is neither much larger nor much smaller than the prosperous family.

The number of children under 16 in the charity families was 47.7 per cent of the charity population, whereas this class of children in the District of Columbia at large constituted only 26.6 per cent of the population. Children under 10 constitute 30.9 per cent of the population of the charity families, while of the total population of the District only 16.8 per cent were under 10 years of age. In the District the excess of females over males among children under 16 was 3.2 per cent; in the charity families the excess was 18.3 per cent. Among children 10 or under 16 the excess of females over males in the charity population was 21.8 per cent, and in the District the excess was only 8.1 per cent. So in the charity families the number of helpless children was relatively great, and the excess in the number of female children was strikingly large.

In 12 per cent of all the families there was desertion. Counting only the families in which the husband and wife were both living, there was desertion in nearly 20 per cent of the cases. Desertion was found in 13 per cent of the white families in which there were both a husband and wife, and in 24.4 per cent of the colored families. In nearly 30 per cent of all the families either the husband or the wife was dead, and in 37.5 per cent of all the cases the family was without a male supporter at its head. The charity family is therefore very often a fatherless family. Divorce does not prevail to any appreciable degree among the charity receiving families.

Of all the persons in the charity families 16 years of age or over, 77.2 per cent were employed in gainful occupations. In the 271 white families in which both husband and wife were at home both husband and wife were gainfully employed in 95 cases, and in the 291

colored families having both a husband and a wife at home both husband and wife were employed in 222 cases. Extreme poverty has relatively a greater effect in drawing white married women into the ranks of wage-earners than it has in the case of colored married women. Of the children under 16 years of age in the charity families, 12 per cent were gainfully employed, a much larger percentage than obtained in the District at large.

On the charity roll many occupations are represented, although laborers, laundresses, and domestics comprised more than 60 per cent of all the chief wage-earners. Among the wage-earners in the families driven to charity were 27 carpenters, 25 painters, 10 plasterers, 9 clerks, 7 iron workers, 5 shoemakers, and 4 plumbers.

The actual earnings of a family receiving charity is a most difficult matter to determine, for at the time of charity seeking there is in most cases only financial chaos. In more than two-thirds of the families the wages of the chief wage-earner at the time of application had entirely ceased. In 80 families there was no wage-earner at all. Altogether three-fourths of the families were deprived of a regular breadwinner at the time of the application, a circumstance that prima facie at least indicates that the poverty of these poor is chiefly an economic or financial and not a moral problem.

In 78 families the chief wage-earner was earning the normal rate of wage at the time of application. In 269 cases the normal wage of the chief wage-earner was reported in dollars and cents. This normal daily wage varied from 8 cents a day to $5 a day. In over two-fifths of the families in which the normal wages were definitely known the rate of the male worker ranged from $1 to $2 per day, the wage most often not exceeding $1.50 per day. These workers were for the most part day laborers, some of them being employed on the streets of the city. In 206 of the families there was evidence of income additional to that derived from labor. In 43 cases pensions were received. With the exception of pensions the element of additional income was insignificant; when the regular earnings of the members of the family were cut off practically everything was gone.

Relief in 60 per cent of the cases consisted in giving food. Next to food, fuel was most frequently given. In nearly half the cases fuel was one of the articles given. The payment of rent does not figure largely in the relief extended, for the reason that the charity organization will seldom undertake to meet arrears in rent, and for the further reason that the applicants adopt the policy of getting the rent paid first and then going to the charity office for food and fuel. The real magnitude of the rent problem in the lives of these recipients is seen in the fact that 208 of the 1,183 families at some time and to some extent found arrears of rent associated with their appeal to charity. The chattel-mortgage loan figured in the distress of 26 families.

In two-thirds of the families there was no marked delinquency whatever. Of the 394 families tainted with delinquency 174 were white and 220 colored, these numbers representing 38 per cent of the total white families and 30 per cent of the total colored families, respectively. The leading delinquencies were intemperance, desertion, licentiousness, neglect by natural supporters, lawlessness, thievery, and mendicancy. In nearly one-third of all the families in which delinquency was visible intemperance was the evil. In 96 cases the intemperance was in the white families and in 32 cases in colored families. Next to intemperance is the vice of desertion. In 102 cases desertion occurred in colored families and in 42 cases in white families. Licentiousness is third on the list of delinquencies. This vice was discoverable in 17 white families and in 47 colored families. The evidence supporting the charge of licentiousness consisted in part of the presence of illegitimate children, of whom there were 11 in white families and 68 in colored families. Neglect by natural supporters—not including cases of outright desertion—occurred in 12 white families and 31 colored families. Akin to delinquency, but not included among the delinquencies, was a certain reliance upon charity, a certain inclination to pauperism. This spirit of dependence cropped out in 69 families, 40 of which were white and 29 colored.

When considering the causes of the distress of the recipients it was found practicable to avoid using the terms "inefficiency," "ignorance," and "irregularity of employment" to denote causation. The subject of regularity and irregularity of employment, however, received careful attention, and it was found that of the 1,051 cases in which it was possible to characterize the employment of the chief wage-earner as regular or irregular, 919 were irregular.

In the discussion of causes the expression "financial element" is used to include one or several or all of the following elements of causation: Insufficient earnings, lack of employment, sickness, accident, old age, and severe weather. In 28 families (20 white, 8 colored) the financial element did not enter at all into the explanation of the causes of distress.

Among the immediate causes of distress—those that impinged directly on the consciousness of the applicant and hurried him to the charity office—sickness figured in nearly one-half of the families, rheumatism and tuberculosis leading all the other diseases. Next to sickness, lack of employment was the immediate cause of most distress, more than one-third of all the cases being assigned to this cause. Third in the list of immediate causes stands insufficient wages. In 81 families the wages were so low that the family could not live upon the earnings, even though the full wage was being received at the time of the application. In 55 cases the immediate cause of distress was

due to accident. Illustrations of the circumstances attending these accidents show plainly enough the need of a liberal liability law. In 49 cases old age was the direct cause of the appeal to charity.

Sickness, lack of employment, insufficient wages, accident, and old age constituted 94 per cent of all direct causes. That is to say, in nineteen cases out of twenty the impelling cause of the application is directly referable to a financial factor.

In the immediate causes of 329 cases could be seen a full explanation of the distress. In 854 the immediate cause was supplemented by a contributory cause. As contributory causes sickness, insufficient earnings, lack of employment, and accident figure very much less than they did as immediate causes, while desertion, intemperance, and neglect by natural supporters figured very much more. Among the contributory causes there appear also certain causes that did not appear among the direct causes, such as licentiousness, shiftlessness, mendicancy, thievery. While the immediate causes were in the vast majority of cases due to financial adversity, the undercurrent of distress was strongly colored with moral delinquency—desertion, intemperance, licentiousness, neglect by natural supporters, mendicancy, and thievery constituting about 25 per cent of all the contributory forces. In 55 families the controlling cause of distress was put down as shiftlessness, a fault that was regarded as consisting in a failure to make the best of opportunities. In 79 cases severe weather operated as a contributing cause.

When studying the subject of underlying or persisting causes, it was convenient to classify the cases as temporary, intermittent, or permanent. More than one-third of the cases were found to be temporary, and in these, of course, no deep-seated cause was discernible. In 768 cases it was possible to assign a persistent or underlying cause of the poverty. Here the nonfinancial or moral element figured much more prominently than in any previous comparison. As direct impelling causes shiftlessness, desertion, intemperance, and licentiousness had to answer for hardly 5 per cent of all the cases. As contributory causes they prevailed in about 25 per cent of all the cases, but as the underlying cause of prolonged distress they prevailed in one-third of all the cases.

RECENT REPORTS OF STATE BUREAUS OF LABOR STATISTICS.

MAINE.

Twenty-first Annual Report of the Bureau of Industrial and Labor Statistics for the State of Maine, 1907. Thomas J. Lyons, Commissioner. 520 pp.

The following subjects pertaining to the labor interests of the State are presented in this report: Factories, mills, and shops built during 1907, 4 pages; labor unions, 95 pages; women and children in sardine factories, 17 pages; women wage-workers of Portland, 30 pages; school-teachers, 121 pages; opportunities for new industries, 172 pages; labor laws, 32 pages; report of the inspector of factories, workshops, mines, and quarries, 5 pages.

FACTORIES, MILLS, AND SHOPS BUILT.—Returns show that in 1907 in 95 towns 133 buildings were erected or enlarged, remodeled, etc., at a total cost of $4,140,960. These improvements provided for 3,566 additional employees. A summary of improvements of this character is presented for the ten years 1898 to 1907:

FACTORIES, MILLS, AND SHOPS BUILT OR ENLARGED, ETC., DURING THE TEN YEARS 1898 TO 1907.

Year.	Number of towns.	Number of buildings.	Aggregate cost.	New employees.
1898	64	72	$675,100	2,024
1899	103	138	6,800,700	4,990
1900	114	167	2,174,825	5,539
1901	94	121	5,638,200	6,337
1902	91	129	2,776,930	5,017
1903	96	124	1,436,900	3,343
1904	91	113	1,175,500	3,276
1905	93	114	2,303,410	3,329
1906	104	131	2,637,500	3,674
1907	95	133	4,140,960	3,566

LABOR UNIONS.—Under this title is given a list of all federations and unions reporting, together with the addresses of the secretaries. There were 2 state and 11 central federations and 225 local unions in 68 cities, towns, and plantations. Of the local unions known to exist in 1907, 4 failed to report membership and 5 sent no report. The reports from the unions give, by cities and towns, the date of organization, membership, qualifications for membership, initiation fees, dues, benefits allowed, hours of labor, rates of wages, etc.

The 215 local unions reporting comprised an aggregate membership of 16,804. Compared with 1906, a net gain of 10 unions is shown and

a gain in reported membership of 2,032. There were 117 unions which reported that they were working under trade agreements with employers and 100 which were not.

To the question, "What have you accomplished for labor by organization?" a wide range of replies was returned by the unions; but a majority of them asserted that higher wages and a shorter workday, as well as improved working conditions and social benefits, had been gained. To the question, "Do nonunion men enjoy the same conditions as to labor, wages, and steady employment as union men?" 172 unions made reply, 69 indicating that nonunion men enjoy equal conditions with union men and 103 that they do not.

Under this chapter is also given historical sketches of the Granite Cutters' International Association of America and the Lobster Fishermen's National Protective Association (national organizations originating in Maine), together with an account of the labor demands and differences occurring in the State during the year.

Women and Children in Sardine Factories.—This chapter is devoted to the industrial conditions surrounding the women and children employed in the sardine packing factories of Washington County, the principal center of the industry. The pounds of sardines packed in the State in 1905 amounted to 86,218,610, or 98.8 per cent of the total pounds for the United States, and were valued at $4,291,324. The report briefly describes the workings of the various stages of the industry in addition to considering living expenses, wages, and hours of employment, the irregular nature of the work (as everything depends upon "the catch"), and other employment available when the packing season closes. The 30 sardine factories within the towns of Eastport and Lubec employed in the canning of fish during the 1906 season over 1,600 women and children. Of this number about two hundred were children of various ages, one-half of whom were probably under 14 years of age. The work is mostly paid for by the piece.

Women Wage-workers of Portland.—The purpose of this report is to present facts pertaining to the lines of work in which women are numerously employed in the city of Portland, together with figures showing the average financial returns and the cost of living, and an account of representative societies which are the outgrowth of existing business and industrial conditions. All occupations, both of an industrial and clerical nature, in which women are employed are considered, the number of women finding employment in each, with the weekly wages paid, being given. For most of the industrial occupations hours of labor are also given. According to the United States census of 1900 there were employed in the city of Portland 5,531 women wage-earners. During the years since then the number has largely increased. Tenement houses, child labor, and night

schools are also given consideration in addition to the welfare work of various establishments of the city and of different societies and organizations.

SCHOOL TEACHERS.—This presentation consists of letters, arranged by counties, from school superintendents and school teachers throughout the State giving personal expression respecting existing conditions in the public schools and the necessity for higher salaries than are at present paid, especially in the rural and village schools. In addition, there are given compilations of 1,100 returns from rural and village teachers, out of over 1,600 returns which were received from teachers of all grades. These 1,100 returns from teachers are grouped, by counties, in four classes—rural schools taught by female teachers with no normal training and with normal training; village schools taught by female teachers with no normal training and with normal training—and give statistics as to salaries, living expenses, length of school year, number of years they had been engaged in teaching, number of years they had attended high schools or academies, etc. These returns are summarized in the statement which follows:

STATISTICS OF TEACHERS IN RURAL AND IN VILLAGE SCHOOLS.

Items.	Female teachers, with no normal training, in—		Female teachers, with normal training, in—	
	Rural schools.	Village schools.	Rural schools.	Village schools.
Number of teachers	464	222	210	204
Average length of school year	29 wks., 1 da.	31 wks., 4 da.	29 wks., 0 da.	32 wks. 3 da.
Average weekly wages	$6.70	$8.94	$7.21	$9.71
Average gross salary	$196.21	$284.29	$209.09	$316.55
Average weekly cost of board	$2.20	$3.06	$2.31	$3.29
Average cost of board for school year	$64.24	$97.31	$66.99	$106.25
Average incidental expenses	$16.81	$25.95	$16.14	$24.56
Average net salary	$115.16	$161.03	$125.96	$185.74
Average weekly income on the basis of 52 weeks in the year	$3.77	$5.47	$4.02	$6.09

Of the 1,100 teachers in rural and village schools, both with and without normal training, 559, or 50.8 per cent, remained at home during vacations, and 541, or 49.2 per cent, supplemented their incomes by other gainful occupations. Of the 541 at work, 283, or 52.3 per cent, were engaged in hotel and house work, and 258, or 47.7 per cent, in other avocations.

OPPORTUNITIES FOR NEW INDUSTRIES.—This presentation, which is arranged by counties, towns, and plantations, is designed to show as far as possible the nature and extent of the industrial opportunities of the State as yet undeveloped and the advantages each town has to offer in the way of new business openings. There is also given the number of towns which contain a good supply of various specified natural products, together with a list of the industries

wanted, or those best suited to the several towns, which are named under each industry.

Labor Laws.—This section of the report reproduces the labor laws of the State, compiled from the Revised Statutes for 1903 and from the public laws of 1905 and 1907.

Child Labor.—In the report on factory inspection a table is presented in which it is shown that the number of children working under certificates in certain manufacturing establishments of the State was 877 in 1906 and 1,111 in 1907. The legislature in 1907 made some changes in the law regulating the employment of children in manufacturing and mechanical establishments, the most important of which was fixing the age limit at 14 years, with no chances of excuse coming from any source. Also, the form of the employment certificate was changed.

MICHIGAN.

Twenty-fifth Annual Report of the Bureau of Labor and Industrial Statistics, including the Fifteenth Annual Report of State Inspection of Factories. 1908. Malcolm J. McLeod, Commissioner. xxi, 539 pp.

This report contains 19 chapters, of which Chapters I to IX, 325 pages, are devoted to inspection of factories, stores, hotels, tenement shops, etc. Labor and industrial statistics are presented in Chapters X to XIX under the following titles: Technical papers, 28 pages; report of the state commissioner of labor to the International Association of Factory Inspectors, 5 pages; labor disagreements, 1907, 9 pages; statistics of penal and reformatory institutions, 16 pages; miscellaneous industries, 19 pages; beet-sugar and Portland-cement industries, 13 pages; the coal industry, 21 pages; furniture, boot and shoe, corset, and refrigerator industries, 19 pages; free employment bureaus, 22 pages; statistics of electric railways and of the motive power used in manufacturing in Michigan, 17 pages; laws coming under the jurisdiction of the state bureau of labor, 30 pages.

Technical Papers—Under this title two papers are presented. The first paper, "What our labor laws need to make us proud," discusses in reference to the state child labor, legislation affecting working women, guarding of dangerous machinery, mining laws, factory inspectors, employment bureaus, etc. The second paper deals with the subject "Cost of living, wages, and rising prices." Comparisons are made between the years 1907 and 1902, and also between earlier years, of income and expenditure that enter into the living of the average workingman's family. The cause of rising prices is attributed, by the author of the paper, to the increase in the world's output of gold rather than to the influence of trusts.

LABOR DISAGREEMENTS, 1907.—The report of the work of the state court of mediation and arbitration for the year 1907 in dealing with 11 labor disagreements is given in this chapter.

PENAL AND REFORMATORY INSTITUTIONS.—Under this title appear the reports of the wardens and superintendents of these institutions. Tables are given showing the number of officials and salary of each, number of inmates, cost of clothing, and feeding of inmates, number of inmates employed at contract labor, rate per day of contract labor, and hours of labor, and number of inmates employed in systems of labor other than contract.

MISCELLANEOUS INDUSTRIES.—The statistical information contained in this chapter is reproduced from the reports of the United States Census Bureau, and covers 15 industries of the State. In addition to data for 1905, the presentation gives for 10 of the 15 industries comparative figures for 1900.

BEET SUGAR AND PORTLAND CEMENT INDUSTRIES.—In the beet-sugar industry 16 factories were in operation during the year 1907, the same number as in 1906. These 16 factories represented a total cost of $10,700,000. The acreage devoted to beet raising in 1907 was 99,586, an increase over 1906 of 3,069 acres. The tons of beets grown in 1907 were estimated at 723,880, and the pounds of sugar made at 165,074,900. There were 1,495 skilled laborers and 2,306 other laborers employed in the factories, with an average daily wage of $2.93 for the former, and of $1.86 for the latter.

In the cement industry 15 of the 17 plants in the State were in operation at the time of the investigation. The aggregate cost of the plants in operation was $8,320,000, and their aggregate daily capacity 19,160 barrels. The output for 1907 was 3,644,473 barrels. There were on the pay rolls 609 skilled laborers, at an average daily wage of $2.84, and 1,253 other laborers, at an average daily wage of $1.85. The average daily wage of all employees was $2.17, and the annual wage pay roll amounted to $1,365,960.

THE COAL INDUSTRY.—In this industry there were 34 coal mines in operation during the year 1907, as compared with 38 mines during the year 1906. A condensed summary of the operations of the mines for the two years is presented in the following table:

COAL MINE STATISTICS, 1906 AND 1907.

Items.	Year.	
	1906.	1907.
Mines in operation	38	34
Average number of employees	2,119	2,881
Average hours worked per day	7.8	8
Average days worked per month	22.3	20.4
Average daily wages	$2.40	$3.24
Tons of coal mined	1,372,854	1,898,426
Average cost of mining per ton	$1.50	$1.64½

A personal canvass was made of 2,023 miners, employed in 24 mines, of which 1,300 were married and 723 were single. There were 1,138 of the miners who had 5,051 others besides themselves to support. The average daily wages of the miners canvassed was $3.11. As to nationality, 50 per cent of the miners were American or English born; those foreign born had lived in the United States an average of 22½ years.

In 19 mines 54 accidents were reported—7 fatal, 7 serious, 27 severe, and 13 slight.

Furniture, Boot and Shoe, Corset, and Refrigerator Industries.—These four industries were the subjects of a special canvass made in 1907.

In the investigation of the furniture industry 150 establishments (in 40 towns) were visited, the establishments representing an invested capital of $13,802,402. They employed 16,310 adult males, at an average daily wage of $1.92; 513 adult females, at an average daily wage of $1.40; 542 boys between 14 and 16 years of age, at an average daily wage of $1.10; and 61 girls between 14 and 16 years of age, at an average daily wage of $0.80. The cost of material used by the factories aggregated $11,801,370 and the value of product $26,662,414.

Seventeen establishments engaged in the manufacture of shoes (in 11 towns) were canvassed, the establishments representing an invested capital of $1,901,400. They employed 1,413 adult males, at an average daily wage of $1.85; 815 adult females, at an average daily wage of $1.18; 126 boys between 14 and 16 years of age, at an average daily wage of $0.84; and 111 girls between 14 and 16 years of age, at an average daily wage of $0.67. The cost of material used aggregated $3,176,945 and the value of the product $6,176,771.

Seven establishments engaged in the manufacture of corsets (in 4 towns) were canvassed. They employed 257 adult males, at an average daily wage of $2.25, and 1,081 adult females and 176 females under 16 years of age, at an average daily wage of $1.10. The cost of material used aggregated $1,225,500 and the value of product $2,457,880.

Ten establishments engaged in the manufacture of refrigerators (in 9 towns) were canvassed. They employed 1,596 adult males, at an average daily wage of $1.69, and (in 5 factories) 58 boys under 16 years of age, at an average daily wage of $0.92. The cost of material used aggregated $1,483,126 and the estimated value of product $2,739,662.

Free Employment Bureaus.—Under this title is presented a detailed report of the work done in the four free employment bureaus of the State. Two of the bureaus (one at Saginaw and one at Kalamazoo) were opened during 1907. The following table summarizes

the work done at the Detroit and Grand Rapids bureaus for the year ending November 30, 1907, at the Saginaw bureau for the period July 19 to November 30, 1907, and at the Kalamazoo bureau for the period August 7 to November 30, 1907:

OPERATIONS OF FREE PUBLIC EMPLOYMENT OFFICES.

City.	Situations wanted.		Help wanted.		Positions secured.	
	Males.	Females.	Males.	Females.	Males.	Females.
Detroit	9,831	1,581	10,363	2,007	9,831	1,581
Grand Rapids	4,172	2,553	3,933	3,202	3,465	2,346
Saginaw	1,234	294	1,510	406	878	214
Kalamazoo	800	259	452	267	379	140
Total	16,037	4,687	16,258	5,882	14,553	4,281

Electric Railways.—In 1907 there were 23 electric railways in Michigan, with a total invested capital of $38,031,000, and paying in wages to 6,534 employees the sum of $4,692,762. The statement following gives the number of employees connected with these railways, together with their average daily wages and daily hours of work:

NUMBER, HOURS OF LABOR, AND DAILY WAGES OF ELECTRIC RAILWAY EMPLOYEES, 1907.

Occupation.	Number of employees.	Average daily hours of labor.	Average daily wages.
Division superintendents	16	.....	$3.55
Assistant division superintendents	24	.....	2.59
Foremen	71	.....	2.35
Office employees	324	9	1.66½
Conductors	1,405	9½	2.21
Motormen	1,399	10	2.20½
Electricians	90	10	2.28
Engineers	43	10½	2.94
Firemen	74	10	1.96
Oilers	44	11	2.11
Linemen	75	10¼	2.22
Motor inspectors	148	10	2.07
Machinists	38	10	2.42
Carpenters	99	9	2.28
Painters	55	10	2.15
Car-house men	210	10⅓	1.73
Track laborers	2,280	10	1.74½
Other employees	139	10	1.52

Power Used in Manufacturing in Michigan.—Of the 8,335 manufacturing establishments embraced in this presentation 3,327 used steam power, 1,478 used electric power, 924 used gas or gasoline power, 270 used water power, 372 used rented power (kind not reported), and 1,964 establishments required no power to operate. The total power generated in the 6,371 power-using establishments was 906,979 horsepower. Also, statistics are given of steam boilers and their equipment and kind of alarms in use and their condition. The data in detail are presented by counties.

NEW JERSEY.

Thirteenth Annual Report of the Bureau of Statistics of Labor and Industries of New Jersey, for the year ending October 31, 1907. Winton C. Garrison, Chief. xiv, 675 pp.

This report consists of 4 parts, in which the following subjects are presented: Statistics of manufactures, 123 pages; steam railroads, 12 pages; cost of living, 17 pages; fruit and vegetable canning, 10 pages; New Jersey as a manufacturing State, 33 pages; economic changes in the building trades of Essex County, 60 pages; historical review of the bureau of statistics of labor and industries, 40 pages; industrial chronology, 369 pages.

STATISTICS OF MANUFACTURES.—This presentation of the statistics of manufactures is based on returns for the year 1906, secured from 2,120 establishments, 2,039 representing 88 specified industries and 81 grouped as unclassified. None of the establishments considered employed fewer than 10 persons or had an invested capital of less than $5,000. The facts are set out in ten tables, which show by industries character of establishment management (whether corporate or private), amount of capital and the various forms in which it is invested, value of stock or materials used and of goods produced, number of wage-earners (men and women, and children under 16 years of age) and wages and earnings, days in operation during the year and hours worked per day and per week, percentage of business done of total productive capacity, and character and measure of power used.

The returns show that of the 2,120 establishments reporting 1,326 (in 1,321 of which were 71,876 stockholders) were under the corporate form of ownership and management and 794 (with 1,407 partners and proprietors) were owned and managed by partnerships and private individuals. Capital invested (by 2,113 establishments) showed an aggregate of $579,705,607, value of materials or stock used (by 2,115 establishments) an aggregate of $428,030,730, and value of products or goods made (by 2,111 establishments) an aggregate of $705,489,666. The total paid out in wages amounted to $131,587,332. During the year there was an average of 260,072 wage-earners employed, 191,208 males 16 years of age or over, 62,189 females 16 years of age or over, and 6,675 children under 16 years of age. Under normal conditions the average number of hours worked per day in the 2,120 establishments was 9.58, and the average number of hours worked per week 55.32. The average number of days in operation during the year was 289.02, and the average proportion of business done of total productive capacity was 78.22 per cent.

The table following presents the number and per cent of males and females 16 years of age or over and of children under 16 years

of age employed in 1906 in all industries (2,120 establishments) at each specified weekly rate of wages:

NUMBER AND PER CENT OF MALES AND FEMALES 16 YEARS OF AGE OR OVER AND OF CHILDREN UNDER 16 YEARS OF AGE IN ALL INDUSTRIES (2,120 ESTABLISHMENTS), RECEIVING EACH CLASSIFIED WEEKLY RATE OF WAGES, 1906.

Classified weekly wages.	Number.				Per cent.			
	Males 16 years of age or over.	Females 16 years of age or over.	Children under 16 years of age.	Total.	Males 16 years of age or over.	Females 16 years of age or over.	Children under 16 years of age.	Total.
Under $3	1,212	1,712	1,028	3,952	0.6	2.6	14.3	1.4
$3 or under $4	3,224	4,565	3,128	10,917	1.5	6.8	43.6	3.8
$4 or under $5	6,004	10,146	2,088	18,238	2.8	15.2	29.1	6.3
$5 or under $6	7,183	12,603	731	20,517	3.4	18.9	10.2	7.1
$6 or under $7	8,675	12,088	158	20,921	4.0	18.1	2.2	7.3
$7 or under $8	12,800	8,761	36	21,597	6.0	13.1	.5	7.5
$8 or under $9	18,380	5,673	10	24,063	8.6	8.5	.1	8.4
$9 or under $10	31,528	4,309	.....	35,837	14.7	6.5	.....	12.5
$10 or under $12	33,541	3,917	.....	37,458	15.7	5.9	.....	13.0
$12 or under $15	34,838	2,280	.....	37,118	16.3	3.4	.....	12.9
$15 or under $20	38,312	564	.....	38,876	17.9	.9	.....	13.5
$20 or under $25	11,240	87	.....	11,327	5.2	.1	.....	3.9
$25 or over	6,977	11	.....	6,938	3.3	.....	.....	2.4
Total	213,914	66,716	7,179	287,809	100.0	100.0	100.0	100.0

The following comparative table shows for selected industries, for the years 1905 and 1906, the average number of persons employed per industry and the average yearly earnings per employee:

AVERAGE NUMBER OF EMPLOYEES PER INDUSTRY AND AVERAGE YEARLY EARNINGS PER EMPLOYEE, 1905 AND 1906, BY INDUSTRIES.

Industry.	Average employees per industry.		Average yearly earnings per employee.	
	1905.	1906.	1905.	1906.
Artisans' tools	2,037	2,445	$543.17	$585.24
Boilers, steam	2,249	1,996	472.18	629.14
Brewery products	1,964	2,065	894.37	898.31
Brick and terra cotta	6,742	7,419	448.40	469.02
Chemical products	6,546	6,839	487.49	513.49
Cigars and tobacco	7,223	8,376	316.70	294.78
Drawn wire and wire cloth	.....	1,867	541.00	596.21
Electrical appliances	5,462	6,739	510.23	519.52
Furnaces, ranges, and heaters	1,885	1,915	659.50	686.32
Glass, window and bottle	6,263	6,190	539.97	569.60
Hats, men's	5,563	5,832	586.47	581.53
Jewelry	3,091	3,482	645.97	682.31
Leather, tanning and finishing	5,616	5,722	523.60	617.59
Lamps, electric and other	2,042	2,317	401.71	433.75
Machinery	19,154	24,393	599.06	631.37
Metal goods	5,654	6,751	471.95	450.45
Oils	3,683	3,753	635.67	644.10
Paper	2,287	2,419	497.34	502.27
Pottery	4,646	4,833	593.91	629.95
Rubber products, hard and soft	5,761	6,280	480.11	489.76
Shipbuilding	3,523	3,822	568.89	677.56
Silk goods, broad and ribbon	22,456	21,543	438.54	434.72
Steel and iron, structural	3,295	3,429	598.08	627.34
Steel and iron, forging	2,569	2,882	615.10	649.35
Woolen and worsted goods	8,531	8,965	373.43	385.30
Twenty-five industries	138,242	152,274	511.06	534.42
Other industries	100,871	107,798	456.58	465.76
All industries	239,113	260,072	488.49	505.96

Steam Railroads.—For the year ending June 30, 1907, the 7 railroads in the State employed 45,810 persons for an average of 292 days per person, each working an average of 10.6 hours per day. The total paid in wages amounted to $28,987,303, the average wages per day being $2.17 and the average yearly earnings per employee $632.99. Five of the companies reported the number of employees injured during the year as 1,567, the injuries of 90 resulting in death.

Cost of Living.—This is a continuation of the presentation of previous years, and shows the retail prices of 50 items of food and 2 other commodities (common soap and kerosene oil) in the principal markets in all counties of the State in the month of June, 1907. Comparisons with retail prices in 1906 and in 1898 (the year the investigation was begun) are also given. Taking the list of commodities together, the prices in 1907 as compared with the prices in 1906 show an increase of 9.7 per cent, which is the largest increase in the cost of living shown by the records of any one year since the annual cost of living inquiry was begun, in 1898. The total net increase, however, was largely due to advances in the price of first and second quality flour per 25-pound bag and in the price of new and old potatoes per bushel. Apart from these 4 items the remaining 46 articles of food show an advance in 1907, as compared with 1906, of only 2.9 per cent.

Fruit and Vegetable Canning.—In 1906 there were 44 canneries from which returns were received. Invested capital to the amount of $920,045 and wages paid to the amount of $341,883 were reported by the canneries. The 44 canneries gave employment to 4,865 wage-earners—2,121 males and 2,744 females. The selling value of the product amounted to $1,581,418.

New Jersey as a Manufacturing State.—A brief historical review of the growth of the manufacturing industries of the State for the fifty-five-year period 1850 to 1905 is presented in this section. The capital invested in manufactures in 1850 was $22,293,258, as contrasted with $715,060,174 in 1905; the number of wage-earners in 1850 was 37,830, as contrasted with 266,336 in 1905; the amount paid in wages in 1850 was $9,364,740, as contrasted with $128,168,801 in 1905, and the total value of the manufactured product in 1850 was $39,851,256, as contrasted with $774,369,025 in 1905.

Economic Changes in the Building Trades.—The purpose of this inquiry was to ascertain what changes had taken place in wages and working hours during the period between the years 1896 and 1906, and incidentally how far rents for the different classes of buildings had been affected thereby. The field of inquiry was limited to Essex County, and the information presented was derived entirely from statements made by employers who had been in business, with but one exception, for periods ranging from 8 to 40 years. The trades or occupations considered are 15 in number. The questions

submitted were designed to bring out the fullest information possible relating to the comparatively new form of business organization that has resulted from the almost complete unionization of the building trades.

Relative to rents, the inquiry led to the conclusion that, fundamentally, the general advance may be safely said to be due to the general and widely diffused prosperity of recent years, which has created a desire for better homes, the supply of which, partly by reason of large increases in the cost of land, material, and labor, has not as yet been sufficient to meet the demand. These circumstances, together with a rapidly growing population competing for homes, account fully for the advance in rents.

Bureau of Statistics of Labor and Industries.—Under this title is presented a historical review of the work of the various state bureaus of labor statistics, with special reference to and detail of that of the New Jersey bureau, which has had an organization for thirty years.

Industrial Chronology.—This record is for the year ending September 30, 1907. During the period there were 581 corporations organized in the State for industrial purposes, having an aggregate capitalization of $88,750,500; 165 new buildings were erected and equipped for manufacturing purposes and 156 old plants more or less enlarged; 10 manufacturing plants were moved into New Jersey from other States (6 from New York and 4 from Pennsylvania); 18 manufacturing plants were permanently closed and 35 closed for a period ranging from two weeks to one month or over; 117 plants suffered from fire, some being totally destroyed, the losses of 108 reporting that item amounting to $2,217,717, all but a small part of which was covered by insurance; there were 149 instances in which employees received an increase in wages (ranging from 2½ to 15 per cent), and 4 firms reduced the hours of weekly labor (five hours in 2 cases and three hours in 2 cases); 1,898 wage-earners (440 being railroad employees) were injured while at work, of which number 425 (180 being railroad employees) died from the injuries received; 162 strikes of greater or less duration occurred, 84 being for increase in wages, 4 for reduction of working hours, 12 for increase of wages and reduction of working hours combined, 11 against the employment of non-union men, 7 for the reinstatement of discharged union men, and the remainder for various other causes. There were 34 new labor unions organized during the chronological period covered. In addition to these there was 1 organization of women formed for the purpose of assisting, as far as possible, all labor unions and the members thereof by pledging themselves to buy only such goods as are the products of union labor and to prevail upon their friends to do likewise.

OHIO.

Thirty-first Annual Report of the Bureau of Labor Statistics of the State of Ohio, for the year 1907. M. D. Ratchford, Commissioner. 523 pp.

This report consists of four parts in which are presented the following subjects: Laws governing the bureau, laws to license and regulate private employment agencies, and recent court decisions, 13 pages; manufactures, 444 pages; coal mining, 20 pages; free public employment offices, 18 pages; chronology of labor bureaus, 3 pages.

MANUFACTURES.—Tables are given for 1906, showing, by industries, for each of the five principal cities, the remaining cities and villages, and totals for the State, the number of establishments reported, capital invested, value of goods manufactured, amount paid for rent, taxes, and insurance, total amount paid in wages, number and monthly pay of salaried employees, number of male and of female wage-earners, number employed by occupations, and average number of days worked, average daily wages, average yearly earnings, and average hours of daily labor. Other tables show, by industries, the number in each occupation affected by a change of wages during the year.

The 9,337 establishments from which returns were received for 1906 reported an invested capital of $494,559,455, and goods produced or manufactured to the value of $1,008,535,149.22. Wages paid 358,292 males and 66,140 females, or a total of 424,432 wage-earners, aggregated $219,039,431.58, and salaries aggregating $44,240,675.16 were paid to 38,878 persons employed as superintendents, office help, etc. During the year 113,014 employees received an average increase in wages of 8.7 per cent, and 8,702 employees suffered an average reduction in wages of 5.2 per cent.

The number of establishments reporting in 1906 was 823 more than in 1905, the value of manufactured products was $134,836,655.62 more than that of 1905, and the amount paid in wages during the year was increased by $29,062,032.35. The aggregate invested capital exceeded that reported for 1905 by $44,857,267, and the salaries paid superintendents, office help, etc., showed an increase of $5,732,229.

COAL MINING.—Tables are given, by counties, showing number of mines reporting, average number of employees, capital invested, value of production, wages and salaries paid, average daily wages, average yearly earnings, average days worked, average hours of daily labor, number in each occupation affected by a change of wages during the year, etc. The following comparative table presents a summary of mining statistics for the years 1905 and 1906:

STATISTICS OF COAL MINING, 1905 AND 1906.

Items.	1905.	1906.	Increase (+) or decrease (−).
Number of mines reporting	587	574	− 13
Number of employees	[a] 37,673	[b] 42,080	+ 4,407
Number of salaried employees	970	953	− 17
Invested capital	$36,630,252.00	$35,761,855.00	− $868,397.00
Value of product	$24,986,266.90	$26,864,427.70	+ $1,878,160.80
Amount paid for rent, taxes, and insurance	$610,508.94	$611,116.79	+ $607.85
Amount paid in wages	$18,872,894.72	$19,467,843.63	+ $594,948.91
Amount paid in salaries	$973,388.40	$989,840.76	+ $16,452.36
Average days worked per employee	173	171	− 2
Average daily wages per employee	$2.48	$2.61	+ $0.13
Average yearly earnings per employee	$429.04	$446.31	+ $17.27
Average hours of daily work	8	8	.....
Number affected by advance in wages	164	40,634	+ 40,470
Number affected by reduction in wages	2	.....	− 2
Average per cent advance in wages	8.9	5.7	− 3.2
Average per cent reduction in wages	13.2	.....	− 13.2

[a] Average for the year, taken from monthly returns.
[b] Number for the year, taken from yearly returns.

FREE PUBLIC EMPLOYMENT OFFICES.—In addition to a text report and an itemized statement of the expenses of each of the five offices for the year ending October 31, 1907, tables are given showing, by years, the results of the operations of each office from date of organization, and for each week of the period October 26, 1906, to October 31, 1907.

The following table shows the operations of the five free public employment offices of the State for the period October 26, 1906, to October 31, 1907:

OPERATIONS OF FREE PUBLIC EMPLOYMENT OFFICES, OCTOBER 26, 1906, TO OCTOBER 31, 1907.

City.	Situations wanted.		Help wanted.		Positions secured.	
	Males.	Females.	Males.	Females.	Males.	Females.
Cleveland	4,935	3,274	6,894	4,370	4,703	3,151
Columbus	2,462	2,442	4,863	3,605	2,353	2,364
Cincinnati	4,030	1,989	3,724	2,266	3,661	1,679
Dayton	4,215	2,778	4,211	5,146	3,720	2,719
Toledo	3,223	1,782	4,850	2,220	2,767	1,425
Total	18,865	12,265	24,542	17,607	17,204	11,338

Since the organization in 1890 of the five free public employment offices there has been a total of 464,109 applications for situations wanted, 434,396 applications for help wanted, and 292,627 positions secured. Of applications for situations 63.1 per cent were filled, and of applications for help 67.3 per cent were filled.

The expenses of the five offices for the year ending October 31, 1907 (excluding salaries), were $2,292.90, of which the expenses of the Cleveland office were $507.37, the Columbus office $340.78, the Cincinnati office $507.05, the Dayton office $511.67, and the Toledo office $426.03.

RECENT FOREIGN STATISTICAL PUBLICATIONS.

CHILE.

La Oficina de Estadistica del Trabajo. Ministerio de Industria i Obras Publicas. 75 pp.

The Chilean ministry of industry and public works publishes in this report an account of the creation and initiatory work of the office for the collection of labor statistics, which has recently been organized as a branch of that executive department. The pamphlet comprises three chapters, the first of which is devoted to a consideration of the disturbed economic and industrial conditions resulting from the earthquake of August 16, 1906, which occasioned a considerable advance in the cost of living and a general scarcity of labor due to the greatly increased activity in the building industry following that catastrophe. The chapter also enumerates the various measures employed by the minister of industry and public works in furtherance of his plan for the organization of a bureau of labor statistics, and includes the draft of a law providing for such an office, which was submitted to the Chilean Congress on January 16, 1907, but upon which no action was taken.

The second chapter gives an account of the creation by ministerial decree of April 5, 1907, of a bureau within the ministry of industry and public works with the following functions, the task of organization being delegated to the chief of the division of agricultural statistics:

To collect, classify, and publish information relating to labor, particularly that employed in industrial establishments; to inquire into the number and class of operatives employed in each industry and the number and class of those whom the development of each industry would require; to ascertain the wages paid to workingmen, estimated by the day and by the hour; to collect information in regard to accidents to labor; to study the length of the working day and the general condition of employment; to investigate the cost of workingmen's houses; and to undertake such other investigations as the Government may desire to commit to its charge.

A circular requesting information concerning the principal subjects enumerated in the decree was addressed to the chief officials of the several provinces and departments comprising the Republic, and from returns received tables were prepared which show for those subdivisions the number of persons employed in industrial establishments, the average daily wages paid in various occupations and industries during the months of November and December, 1906, in

some instances figures for 1903 being also given by way of comparison. From the information thus collected the total number of persons industrially employed is estimated at 43,044.

Copies of the blanks used in the collection of the data, together with the correspondence relating to that and other matters concerning the work of the bureau, are reproduced in the report.

The last chapter contains a discussion of the organization and functions of bureaus of labor statistics in other countries and a brief statement of the usefulness and importance of the Chilean bureau.

ITALY.

I Lavoratori delle Miniere. Ministero di Agricoltura, Industria e Commercio. Ufficio del Lavoro. Parte Prima, 287 pp. 1907.

This report presents the results of an investigation into the condition of the employees in the mines and quarries of Italy, undertaken in 1906, by the bureau of labor of the ministry of agriculture, industry, and commerce at the request of the Mine Labor Congress of 1904. The superior council of labor in the same year expressed its approval of such a study. The topics discussed are the age, conjugal condition, days lost on account of sickness, daily wages, and occupations of the workers.

According to data published in the annual mineral statistics for 1905, the total number of persons in the Kingdom in 1905 employed in mining was 63,996 and in quarrying 59,342.

The age grouping of employees in mines and quarries is shown in the following table:

PER CENT OF EMPLOYEES IN MINES AND IN QUARRIES IN EACH AGE GROUP, AT THE BEGINNING OF 1906.

Industry.	Number of employees.	Per cent of employees—						
		15 years of age or under.	16 to 21 years of age.	22 to 30 years of age.	31 to 40 years of age.	41 to 50 years of age.	51 to 60 years of age.	Over 60 years of age.
Mining	53,795	6.1	22.1	25.8	21.1	15.1	7.5	2.3
Quarrying	11,646	4.5	18.5	23.2	22.1	17.2	10.1	4.4

The largest percentage of workers in mining is shown to be between the ages of 22 and 30, with a rapid decrease in the number of workers in the higher ages. In quarrying the distribution among the groups is more uniform, but also shows the same general features.

The following table shows the results of the investigation in regard to the conjugal condition of the workers in the two industries:

CONJUGAL CONDITION OF EMPLOYEES IN MINES AND IN QUARRIES, BY AGE GROUPS, AT THE BEGINNING OF 1906.

Age group.	Employees in mines.				Employees in quarries.			
	Number.	Per cent of—			Number.	Per cent of—		
		Single.	Married.	Widowed.		Single.	Married.	Widowed.
15 years or under	3,161	100.0	.....	.....	572	100.0	.....	.....
16 to 21 years	11,116	96.6	3.4	.....	2,144	95.2	4.7	0.1
22 to 30 years	12,582	60.6	39.1	0.3	2,705	47.6	51.6	.8
31 to 40 years	10,375	19.3	79.4	1.3	2,579	11.8	86.6	1.6
41 to 50 years	7,514	10.0	87.1	2.9	2,008	8.1	88.8	3.0
51 to 60 years	3,765	7.4	87.2	5.4	1,184	6.5	86.9	6.6
Over 60 years	1,182	5.8	83.5	10.7	515	5.8	81.9	12.2
Total	49,695	49.5	49.0	1.5	11,707	38.1	59.5	2.3

The table indicates that there is an apparent tendency for marriage to occur earlier in life among the quarry workers than among the mine workers.

The number of working days lost on account of sickness during the year 1905 by the mine and quarry workers is as follows:

AVERAGE NUMBER OF EMPLOYEES IN MINES AND IN QUARRIES AND AVERAGE NUMBER OF WORKING DAYS LOST PER EMPLOYEE ON ACCOUNT OF SICKNESS, BY AGE GROUPS, 1905.

Age group.	Employees in mines.		Employees in quarries.	
	Number.	Average days lost.	Number.	Average days lost.
15 years or under	1,984	3.7	185	7.9
16 to 21 years	7,581	4.6	705	7.9
22 to 30 years	9,114	6.0	906	7.8
31 to 40 years	7,479	6.7	890	8.6
41 to 50 years	5,363	6.9	765	9.0
51 to 60 years	2,577	9.5	437	13.6
Over 60 years	800	9.3	206	10.2
Total	34,898	6.2	4,094	9.0

While the total number of quarry workers investigated is much smaller than the number of mine workers, the data may, however, be regarded as representative. According to the preceding table, the rate of sickness is uniformly higher for quarry workers for each of the age groups. For both the mine and the quarry workers there is a general tendency to a higher sickness rate with increasing age. Both classes of workers show a lower rate for the ages over 60, but this is probably due to special influences.

The two following tables show by age groups the per cent of workers in mines and in quarries receiving each classified daily rate

of wages at the beginning of the year 1906. The tables are based on data for 53,795 employees in mines and 11,646 employees in quarries.

PER CENT OF MINE EMPLOYEES RECEIVING EACH CLASSIFIED DAILY RATE OF WAGES AT BEGINNING OF 1906, BY AGE GROUPS.

Daily wage rate.	Per cent of employees in each wage class—							
	15 years of age or under.	16 to 21 years of age.	22 to 30 years of age.	31 to 40 years of age.	41 to 50 years of age.	51 to 60 years of age.	Over 60 years of age.	All ages.
0.50 lira ($0.097) or under	0.8	0.1	0.1	.....	.....	.....	0.2	0.1
0.51 lira ($0.098) to 0.75 lira ($0.145)	8.4	2.2	.3	0.1	0.1	0.1	.2	1.1
0.76 lira ($0.147) to 1.00 lira ($0.193)	28.1	7.3	1.0	.8	.9	1.2	2.7	4.1
1.01 lire ($0.195) to 1.25 lire ($0.241)	27.1	13.0	1.9	1.0	.9	1.5	2.3	5.6
1.26 lire ($0.243) to 1.50 lire ($0.290)	27.2	28.3	6.2	3.7	3.5	3.6	5.0	11.2
1.51 lire ($0.291) to 1.75 lire ($0.338)	4.2	16.1	11.8	7.2	6.8	7.4	9.3	10.1
1.76 lire ($0.340) to 2.00 lire ($0.386)	2.4	13.5	19.1	15.9	15.7	17.1	17.8	15.4
2.01 lire ($0.388) to 2.25 lire ($0.434)	.6	5.7	13.7	12.6	10.6	10.7	9.0	10.1
2.26 lire ($0.436) to 2.50 lire ($0.483)	.4	6.1	17.1	19.9	18.7	19.1	15.8	14.6
2.51 lire ($0.484) to 3.00 lire ($0.579)	.5	5.1	17.0	21.1	22.3	20.9	21.4	15.4
3.01 lire ($0.581) to 4.00 lire ($0.772)	.3	1.7	7.6	11.8	13.0	11.2	10.7	7.9
4.01 lire ($0.774) to 5.50 lire ($1.062)	.....	.6	2.9	4.1	5.4	5.7	4.2	3.1
5.51 lire ($1.063) to 7.00 lire ($1.351)	.....	.2	.8	1.1	1.3	1.1	.9	.8
7.01 lire ($1.353) or over	.....	.1	.5	.7	.8	.4	.5	.5
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

PER CENT OF EMPLOYEES IN QUARRIES RECEIVING EACH CLASSIFIED DAILY RATE OF WAGES AT BEGINNING OF 1906, BY AGE GROUPS.

Daily wage rate.	Per cent of employees in each wage class—							
	15 years of age or under.	16 to 21 years of age.	22 to 30 years of age.	31 to 40 years of age.	41 to 50 years of age.	51 to 60 years of age.	Over 60 years of age.	All ages.
0.50 lira ($0.097) or under	11.3	0.6	0.1	.....	.....	0.1	0.2	0.7
0.51 lira ($0.098) to 0.75 lira ($0.145)	12.5	2.6	.3	0.2	.....	.3	.8	1.2
0.76 lira ($0.147) to 1.00 lira ($0.193)	31.7	7.1	2.6	1.9	2.0	2.3	5.4	4.6
1.01 lire ($0.195) to 1.25 lire ($0.241)	13.0	5.8	1.3	.9	1.2	1.0	3.7	2.6
1.26 lire ($0.243) to 1.50 lire ($0.290)	12.9	11.5	3.4	3.1	3.2	3.9	7.5	5.5
1.51 lire ($0.291) to 1.75 lire ($0.338)	5.9	6.9	4.0	2.4	4.4	5.7	4.2	4.5
1.76 lire ($0.340) to 2.00 lire ($0.386)	4.6	16.2	7.0	7.3	7.1	7.8	12.4	9.0
2.01 lire ($0.388) to 2.25 lire ($0.434)	1.5	8.1	5.8	6.1	5.4	7.5	8.3	6.3
2.26 lire ($0.436) to 2.50 lire ($0.483)	2.5	13.3	12.5	12.1	12.0	12.8	14.5	12.2
2.51 lire ($0.484) to 3.00 lire ($0.579)	2.7	15.7	25.9	21.4	22.0	23.9	21.9	20.9
3.01 lire ($0.581) to 4.00 lire ($0.772)	.8	11.6	32.6	35.1	32.3	27.6	18.2	26.6
4.01 lire ($0.774) to 5.50 lire ($1.062)	.6	.4	3.5	7.2	8.8	5.8	2.5	4.7
5.51 lire ($1.063) to 7.00 lire ($1.351)	.....	.1	.7	1.8	1.1	1.0	.4	.9
7.01 lire ($1.353) or over	.....	.1	.3	.5	.5	.3	.....	.3
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

The table for mine workers shows that the most frequent rates for persons 15 years of age or under are from 0.76 to 1.50 lire (14.7 to 29.0 cents) per day; for persons 16 to 21 years of age the most frequent rates are from 1.01 to 2.00 lire (19.5 to 38.6 cents) per day; for persons 22 to 30 years of age the most frequent rates are from 1.51 to 3.00 lire (29.1 to 57.9 cents) per day; for persons 31 to 40 years of age the most frequent rates are from 1.76 to 4.00 lire (34.0 to 77.2 cents) per day, and the same rates occur most frequently for persons over 40 years of age; though there is a tendency to a decrease in the

ages over 60. For all mine workers the most frequent rates are from 1.26 to 3.00 lire (24.3 to 57.9 cents) per day.

The table for quarry workers shows that the higher wage rates occur more frequently than in the case of the mine workers. For persons 15 years of age or under the rates from 0.50 lira (9.7 cents) or under to 1.50 lire (29.0 cents) occur for over 80 per cent of the workers; for persons 16 years to 21 years of age the most frequent rates are from 1.26 to 4.00 lire (24.3 to 77.2 cents) per day; for persons 22 years to 60 years or over there is a tendency for uniformity in rates, 2.26 to 4.00 lire (43.6 to 77.2 cents) per day being the predominating rates. The same rates also predominate for all the quarry workers.

The following table shows the distribution of the mine workers among the various occupations, as well as the number of days worked and the average wages.

NUMBER OF PERSONS EMPLOYED IN MINING IN EACH OCCUPATION, AVERAGE DAYS WORKED, AND AVERAGE DAILY WAGES RECEIVED IN EACH OCCUPATION, 1905.

Occupation.	Average number of persons employed.					Average number of days worked.	Average daily wages.
	Males.		Females.		Total.		
	Under 15 years of age.	15 years of age or over.	Under 15 years of age.	15 years of age or over.			
Workers below ground:							
Overseers, foremen, etc	.....	862	.....	.....	862	313	$0.66
Pump men	.....	492	.....	.....	492	306	.33
Engineers, firemen, etc	.....	95	.....	.....	95	323	.55
Timbermen, etc	.....	628	.....	.....	628	297	.52
Masons and helpers	37	1,527	.....	.....	1,564	314	.37
Miners, maintenance men, etc	.....	1,410	.....	.....	1,410	239	.43
Miners, pick men, drill men	.....	15,885	.....	.....	15,885	266	.52
Laborers, carrying boys, trammers	2,776	10,607	.....	8	13,391	253	.32
Engine tenders, brakemen, etc	.....	1,494	.....	.....	1,494	268	.43
Sifters	.....	25	.....	.....	25	250	.37
Miscellaneous	43	684	.....	.....	727	281	.42
Total	2,856	33,709	.....	8	36,573	265	.44
Workers above ground:							
Overseers, foremen, watchmen, etc	2	671	.....	9	682	342	.54
Engineers, firemen, pump men	8	652	.....	.....	660	296	.52
Machinists, lathe men, etc	.....	94	.....	.....	94	283	.69
Blacksmiths, fitters, apprentices	56	651	.....	.....	707	285	.49
Masons and helpers	28	381	.....	.....	409	277	.48
Carpenters and apprentices	3	289	.....	.....	292	284	.55
Road men, etc	.....	26	.....	.....	26	287	.39
Pick men, drill men	19	1,710	.....	.....	1,729	302	.71
Laborers, carrier boys, trammers, furnace men	740	5,473	13	133	6,359	261	.36
Engine tenders, brakemen, etc	.....	888	.....	.....	888	269	.43
Sifters	267	843	146	890	2,146	280	.24
Screeners	6	102	.....	39	147	304	.33
Washery workers	3	202	1	89	295	278	.34
Kiln men, etc	1	1,075	.....	.....	1,076	278	.43
Weigh men	.....	31	.....	.....	31	327	.52
Miscellaneous	104	1,769	.....	48	1,921	283	.43
Total	1,237	14,857	160	1,208	17,462	277	.43
Workers below ground and workers above ground	4,093	48,566	160	1,216	54,035	269	.43

The largest number of workers was employed as miners, pick men, etc., and as laborers. The average number of days worked by both

below ground and above ground workers was 269, with a slightly higher number for the above ground workers.

The same data are given in the following table for the quarry workers:

NUMBER OF PERSONS EMPLOYED IN QUARRIES IN EACH OCCUPATION, AVERAGE DAYS WORKED, AND AVERAGE DAILY WAGES RECEIVED IN EACH OCCUPATION, 1905.

Occupation.	Average number of persons employed.					Average number of days worked.	Average daily wages.
	Males.		Females.		Total.		
	Under 15 years of age.	15 years of age or over.	Under 15 years of age.	15 years of age or over.			
Superintendents, contractors	.....	659	.....	.....	659	249	$0.81
Foremen, bosses, etc	.....	37	.....	.....	37	266	.58
Carpenters	.....	21	.....	.....	21	275	.56
Masons	.....	28	.....	.....	28	244	.52
Machinists	.....	64	.....	.....	64	253	.62
Blacksmiths, etc	7	117	.....	.....	124	246	.58
Firemen	.....	33	.....	.....	33	263	.44
Miners	.....	1,341	.....	.....	1,341	243	.55
Quarrymen	26	4,169	.....	.....	4,195	233	.56
Laborers	99	2,483	4	11	2,597	242	.44
Apprentices	208	287	.....	.....	495	243	.25
Clearers, diggers, etc	.....	58	.....	.....	58	266	.47
Chiselers, squarers	23	1,878	.....	.....	1,901	239	.61
Carters, loaders, etc	6	466	.....	15	487	243	.49
Stone breakers, etc	4	58	.....	.....	62	240	.53
Kiln men	.....	40	.....	.....	40	245	.36
Miscellaneous	71	650	16	26	763	209	.49
Total	444	12,389	20	52	12,905	238	.53

The occupations in which the largest number of workers was engaged were miners, quarrymen, laborers and chiselers, etc. The average number of days worked was 238.

Salari ed Orari nei Lavori Edilizi, Stradali, Idraulici e di Bonifica, 1906. Ufficio del Lavoro, Ministero di Agricoltura, Industria e Commercio. 1907. 111 pp.

Since October, 1905, the bureau of labor of the Italian department of agriculture, industry, and commerce has conducted monthly inquiries into the amount, character, and conditions of labor performed upon the various kinds of construction and repair work carried on by or on behalf of the State. This information is collected through the offices of the government engineers charged with the direction of the work.

The present report shows the wages and hours of labor of the different classes of employees for the year 1906. The volume comprises three chapters of descriptive matter, followed by a detailed tabular presentation of the data gathered, the latter being arranged by occupations and localities. The first chapter contains a general account of the plan and scope of the inquiry and of the method employed in the collection of the information. The second chapter relates to wages and hours of labor in general and contains a table

showing, by months and by localities, the usual length of the workday in a number of specified occupations. The third chapter is devoted to a consideration of the wages paid and working time most generally observed upon public works in each of the 16 principal subdivisions of the Kingdom.

An appendix shows, for the same territorial groups, the aggregate days of work during each month of the year 1906, classified by character of the enterprise and occupation of the persons employed.

RUSSIA.

Chislennost i Sostav rabochikh v Rossii na osnovanii dannykh pervoi vseobshchei perepisi naselenia Rossiiskoi Imperii 1897 goda (*Number and distribution of wage-workers in Russia, based upon the data of the first general census of population of the Russian Empire in 1897*). Prepared according to the requests of the Ministries of Finance and of Commerce and Industry, and published by the Ministry of Interior. 2 vols., xx, 300; 600 pp. St. Petersburg, 1906.

This report includes a detailed analysis of the data relating to wage-workers employed in Russian industry and commerce, according to the first Russian census of 1897, and in less detail to the wage-workers employed in agriculture and other branches of rural industry, in personal and domestic service, and to unskilled (common) laborers. It represents the results of an effort to study the wage-earning class as distinguished from salaried employees in Russia, and is of the utmost importance in any study of labor conditions in that country.

The reports of the first Russian census of 1897, published in 1905, contain tables showing the distribution of the population by occupation and also analyzing these data by nationality, religion, age, educational standard, etc. In addition the original schedule also contained the question as to the economic status of the individual, i. e., whether the person was an independent producer, employer, salaried employee, or wage-worker. It may be added that in view of the low level of wages the distinction between a salaried employee and a wage-worker is much more definite in Russia than it is in the United States. The elaboration of the data showing the distribution of the population according to economic status was not undertaken, however, because of the expense. After the publication of the general census reports, the ministry of finance, in view of the growing importance of the labor problem, suggested the desirability of a report on the wage-earners in manufacturing, mining, transportation, construction, and commerce. The report was prepared through the cooperation of the ministry of interior, of which the central statistical commission (intrusted with the entire work of the first

census) is a part, the ministry of finance, and the ministry of commerce and industry, the latter having been organized in 1905. To this very exhaustive statistical report briefer data were added concerning the agricultural wage-workers, common laborers, and employees in domestic service, thus furnishing material for the study of the entire wage-earning class.

This report consists mainly of three general tables relating to the wage-workers of the first group (manufactures, mining, transportation, commerce, etc.). Table I shows the total number of wage-workers and of children under 15 years, by sex, for each industry and by the larger geographical divisions and separate provinces (93 pages). Table II shows the distribution of the wage-workers, by sex, conjugal condition, and size of family for each of 28 industrial groups and each geographical division and province (144 pages), Table III is the most elaborate, occupying 50 pages in the first volume and the entire 600 pages of the second volume. It shows the wage-workers by sex and age groups, and under age and sex groups, the number of literates for each industry (classified by 28 principal industries and by 149 branches of those industries) and for each province. The data for the other wage-earning groups are stated briefly in 12 pages, giving total number and distribution by age, sex, and large geographical division, and using a very simple classification of 10 groups.

The following table shows the number of wage-earners in Russia by sex, main industry groups, and geographical divisions:

NUMBER OF WAGE-EARNERS BY SEX, MAIN INDUSTRY GROUPS, AND GEOGRAPHICAL DIVISIONS, 1897.

Industry and sex.	Wage-earners in each group in—					Total wage-earners.
	European Russia.	Poland.	Caucasus.	Siberia.	Middle Asia.	
Mining, manufacturing, transportation, and commerce:						
Male	2,254,099	259,871	118,390	106,659	37,484	2,776,503
Female	384,079	51,179	4,540	4,328	936	445,062
Total	2,638,178	311,050	122,930	110,987	38,420	3,221,565
Agricultural pursuits:						
Male	1,281,626	297,711	159,620	124,134	106,362	1,969,453
Female	554,376	142,890	21,413	29,911	4,580	753,170
Total	1,836,002	440,601	181,033	154,045	110,942	2,722,623
Common laborers:						
Male	479,307	103,415	90,491	55,442	80,771	809,426
Female	206,558	50,477	12,253	12,415	3,719	285,422
Total	685,865	153,892	102,744	67,857	84,490	1,094,848
Servants:						
Male	593,434	95,553	45,631	25,419	16,564	776,601
Female	1,054,304	177,931	45,549	44,611	13,639	1,336,034
Total	1,647,738	273,484	91,180	70,030	30,203	2,112,635
All occupations:						
Male	4,608,466	756,550	414,132	311,654	241,181	6,331,983
Female	2,199,317	422,477	83,755	91,265	22,874	2,819,688
Total	6,807,783	1,179,027	497,887	402,919	264,055	9,151,671

The total number of wage-earners, as determined by this investigation, was 9,151,671, of whom 69.2 per cent were male and 30.8 per cent female. In the table is shown the distribution of these wage-earners by sex, main industry groups, and geographical divisions. The wage-earners engaged in mining, manufacture, transportation, and commerce constituted 35.2 per cent, the agricultural laborers 29.7 per cent, the common or unskilled laborers 12.0 per cent, and the servants 23.1 per cent. The greatest proportion of wage-earners were in European Russia, with 74.4 per cent, and Poland, with 12.9 per cent, leaving only 12.7 per cent for the entire expanse of Asiatic Russia and the Caucasus. If the industrial wage-earners alone (those employed in mining, manufacturing, transportation, and commerce) are taken into consideration, a still smaller portion was found in Asiatic Russia and Caucasus, as European Russia had 81.9 per cent, Poland 9.7 per cent, Caucasus 3.8 per cent, Siberia 3.4 per cent, and Middle Asia 1.2 per cent.

Women constituted a very important element in the wage-earning population of Russia, namely, over 30 per cent. Naturally the greatest number of women wage-earners belonged to the servant group, of which they constituted 63.3 per cent, while of the agricultural laborers 27.7 per cent were women, of the unskilled laborers 26.1 per cent, and in industrial pursuits 15.8 per cent.

The degree of participation of women in separate industries is shown in greater detail in the following table, from which the nature of the wage-work of women can be better studied:

NUMBER AND PER CENT OF WAGE-EARNERS OF EACH SEX, BY INDUSTRIES, 1897.

Industry.	Total wage-earners.	Males.		Females.	
		Number.	Per cent.	Number.	Per cent.
Mining:					
Miners	163,738	155,020	94.7	8,718	5.3
Smelters	42,638	40,940	96.0	1,698	4.0
Total	206,376	195,960	95.0	10,416	5.0
Manufacturing:					
Textiles	530,138	310,439	58.6	219,699	41.4
Animal products	74,270	71,246	95.9	3,024	4.1
Wood working	173,043	166,295	96.1	6,748	3.9
Metal working	370,933	364,720	98.3	6,213	1.7
Minerals	83,138	74,469	89.6	8,669	10.4
Chemical products	61,094	45,247	74.1	15,847	25.9
Beverages—					
Alcoholic liquors	38,723	36,918	95.3	1,805	4.7
Other	4,220	4,035	95.6	185	4.4
Food products	194,703	183,941	94.5	10,762	5.5
Tobacco	27,994	10,620	37.9	17,374	62.1
Paper and printing	52,175	46,550	89.2	5,625	10.8
Instruments	8,030	7,722	96.2	308	3.8
Jewelry, etc	25,767	25,213	97.8	554	2.2
Clothing	326,470	256,889	78.7	69,581	21.3
Building	345,724	345,724	100.0	.....	.....
Carriages and wooden boats	8,793	8,768	99.7	25	.3
Other	65,357	54,029	82.7	11,328	17.3
Total	2,390,572	2,012,825	84.2	377,747	15.8

NUMBER AND PER CENT OF WAGE-EARNERS OF EACH SEX, BY INDUSTRIES, 1897—Concluded.

Industry.	Total wage-earners.	Males.		Females.	
		Number.	Per cent.	Number.	Per cent.
Transportation:					
Post, telegraph, and telephone	5,463	5,439	99.6	24	.4
Water transportation	44,141	43,885	99.4	256	.6
Railroads	175,246	162,784	92.9	12,462	7.1
Carting	118,423	117,761	99.4	662	.6
Other	25,756	25,391	98.6	365	1.4
Total	369,029	355,260	96.3	13,769	3.7
Commercial pursuits:					
Commerce	118,787	113,171	95.3	5,616	4.7
Hotels, restaurants, etc	76,970	72,266	93.9	4,704	6.1
Liquor trade	17,336	15,270	88.1	2,066	11.9
Cleaning, laundry work, etc	42,495	11,751	27.7	30,744	72.3
Total	255,588	212,458	83.1	43,130	16.9
Agricultural pursuits, etc.:					
Agriculture	2,132,899	1,467,302	68.8	665,597	31.2
Cattle raising	411,817	341,596	82.9	70,221	17.1
Forestry	84,714	83,404	98.5	1,310	1.5
Other rural industries	57,990	44,820	77.3	13,170	22.7
Fishing and hunting	35,203	32,331	91.8	2,872	8.2
Total	2,722,623	1,969,453	72.3	753,170	27.7
Common (unskilled) laborers	1,094,848	809,426	73.9	285,422	26.1
Servants:					
In institutions	167,240	142,706	85.3	24,534	14.7
In factories, etc	226,743	205,720	90.7	21,023	9.3
House servants (janitors, etc.)	162,053	160,089	98.8	1,964	1.2
Domestic servants	1,556,599	268,086	17.2	1,288,513	82.8
Total	2,112,635	776,601	36.7	1,336,034	63.3
Grand total	9,151,671	6,330,983	69.2	2,819,688	30.8

Of all the wage-earning women, domestic servants constituted 45.7 per cent, agricultural laborers 23.6 per cent, common laborers 10.1 per cent, textile workers 7.8 per cent, those employed in cattle raising 2.5 per cent, in manufacture of clothing 2.5 per cent, and in all other industries 7.8 per cent, so that in 6 industries were over 90 per cent of the female wage-earners. Looking at the same facts from the point of view of the proportion between male and female workers, women were found to predominate in domestic service, comprising 82.8 per cent of all persons employed in this occupation, while other classes of servants showed a very small proportion of women. In cleaning, laundry work, etc., the proportion of women, 72.3 per cent, was almost as great; but somewhat surprising was the very high per cent of women, 62.1 per cent, in the tobacco industry and 41.4 per cent in the textile industry, while in agricultural and other unskilled labor the proportions were lower, being 31.2 per cent and 26.1 per cent, respectively. Female labor was also important in the manufacture of chemical products (soap, candles, matches) and in the clothing industry. It was very limited in mining, in transportation, and in commerce.

The number of children employed under 15 years of age of each sex, and the proportion to the total number of persons employed, are given in the next table:

NUMBER OF WAGE-EARNERS UNDER 15 YEARS OF AGE AND PER CENT OF TOTAL WAGE-EARNERS, BY SEX AND INDUSTRIES, 1897.

Industry.	Total wage-earners.	Children under 15 years of age.			
		Males.	Females.	Total.	Per cent of total wage-earners.
Mining:					
Miners	163,738	1,522	238	1,760	1.1
Smelters	42,638	521	46	567	1.3
Total	206,376	2,043	284	2,327	1.1
Manufacturing:					
Textiles	530,138	9,152	7,835	16,987	3.2
Animal products	74,270	3,444	236	3,680	4.1
Wood working	173,043	9,758	501	10,259	5.9
Metal working	370,933	14,475	327	14,802	4.0
Minerals	83,138	3,435	792	4,227	5.0
Chemical products	61,094	920	658	1,578	2.6
Beverages—					
Alcoholic liquors	38,723	268	41	309	.8
Other	4,220	80	4	84	2.0
Food products	194,703	6,453	520	6,973	3.6
Tobacco	27,994	625	1,170	1,795	6.4
Paper and printing	52,175	4,650	880	5,530	10.6
Instruments	8,030	1,125	31	1,156	14.4
Jewelry, etc	25,767	3,977	74	4,051	15.7
Clothing	326,470	40,535	17,606	58,141	17.8
Building	345,724	5,197	.....	5,197	1.5
Carriages and wooden boats	8,793	592	1	593	6.7
Other	65,357	684	309	993	1.5
Total	2,390,572	105,370	30,985	136,355	5.7
Transportation:					
Post, telegraph, and telephone	5,463	42	.....	42	.7
Water transportation	44,141	160	3	163	.3
Railroads	175,246	273	55	328	.2
Carting	118,423	858	15	873	.7
Other	25,756	70	2	72	.3
Total	369,029	1,403	75	1,478	.4
Commercial pursuits:					
Commerce	118,787	18,176	520	18,696	15.7
Hotels, restaurants, etc	76,970	5,362	107	5,469	7.1
Liquor trade	17,336	1,533	77	1,610	9.3
Cleaning, laundry work, etc	42,495	1,062	620	1,682	4.0
Total	255,588	26,133	1,324	27,457	10.7
Agricultural pursuits, etc.:					
Agriculture	2,132,899	71,218	36,705	107,923	5.1
Cattle raising	411,817	92,515	30,756	123,271	29.9
Forestry	84,714	907	44	951	1.1
Other rural industries	57,990	1,203	1,225	2,428	4.2
Fishing and hunting	25,203	612	96	708	2.8
Total	2,712,623	166,455	68,826	235,281	8.7
Common (unskilled) laborers	1,094,848	15,661	8,011	23,672	2.2
Servants:					
In institutions	167,240	1,111	178	1,289	.8
In factories, etc	226,743	2,363	916	3,279	1.4
House servants (janitors, etc.)	162,053	1,287	98	1,385	.9
Domestic servants	1,556,599	14,182	154,615	168,797	10.8
Total	2,112,635	18,943	155,807	174,750	8.3
Grand total	9,151,671	336,008	265,312	601,320	6.6

The total number of wage-earning children under 15 years of age was 601,320, or 6.6 per cent of the total wage-earners. Of this number 336,008, or 56 per cent, were boys. The classes of domestic service, agricultural labor, and cattle raising numbered 399,991, or 66.5 per cent of all the children. Domestic service was the main occupation of the girls, employing 58.3 per cent, and agriculture and cattle raising the main occupation of the boys, employing 48.7 per cent. In manufactures children constituted 5.7 per cent of the total number of wage-earners. The principal manufacturing industries employing child labor were clothing, textiles, metal working, wood working, food products, and paper and printing, named in the order of their importance as to the numbers employed.

The age distribution of the industrial workers is shown by sex, conjugal condition, and the educational standard in the following table:

NUMBER OF MALE AND FEMALE WAGE-EARNERS AND PER CENT MARRIED AND LITERATE, BY INDUSTRY AND AGE GROUPS, 1897.

Industry and age.	Males.			Females.		
	Total.	Per cent married.	Per cent literate.	Total.	Per cent married.	Per cent literate.
Mining, manufacturing, transportation, and commerce:						
12 years or under	33,240	.....	54.5	9,917	.....	40.6
13 to 14 years	101,709	.....	69.5	22,761	.....	56.2
15 to 16 years	195,077	0.1	69.6	47,335	0.9	47.5
17 to 19 years	361,747	4.5	65.6	81,369	8.7	39.8
20 to 39 years	1,519,096	63.6	55.4	215,685	54.0	25.4
40 to 59 years	494,506	83.2	42.1	59,584	45.8	13.3
60 years or over	69,733	68.7	33.7	8,226	17.4	15.3
Age unknown	1,395	41.4	37.9	185	41.6	23.8
Total	2,776,503	51.9	55.4	445,062	34.3	30.5
Agricultural pursuits:						
12 years or under	77,400	.....	21.3	31,875	.....	22.7
13 to 14 years	89,055	.....	28.4	36,951	.....	28.1
15 to 16 years	141,509	.2	28.6	67,394	.5	27.8
17 to 19 years	257,862	2.8	31.5	124,887	5.3	31.7
20 to 39 years	897,103	54.1	25.9	309,084	40.6	33.2
40 to 59 years	389,495	77.1	24.5	145,306	38.0	24.1
60 years or over	115,316	65.6	22.5	37,184	19.6	23.6
Age unknown	1,713	30.9	18.1	489	19.0	17.4
Total	1,969,453	44.1	26.3	753,170	25.9	29.5
Common laborers:						
12 years or under	6,077	.....	13.0	2,976	.....	9.6
13 to 14 years	9,584	.....	26.1	5,035	.....	15.1
15 to 16 years	24,523	.5	29.5	13,344	1.0	16.4
17 to 19 years	59,611	3.8	34.8	26,346	7.7	17.5
20 to 39 years	412,992	59.8	30.8	113,155	43.6	15.9
40 to 59 years	227,185	77.6	24.4	96,184	29.2	11.2
60 years or over	68,344	69.6	17.9	28,150	13.5	10.3
Age unknown	1,110	18.6	12.9	232	22.0	12.9
Total	809,426	58.5	27.9	285,422	29.3	13.9
Servants:						
12 years or under	7,606	.....	27.5	68,840	.....	13.8
13 to 14 years	11,337	.....	47.4	86,967	.....	21.4
15 to 16 years	22,500	.6	49.6	131,950	.3	24.1
17 to 19 years	55,692	4.8	50.0	213,943	3.5	27.7
20 to 39 years	384,763	64.9	51.0	540,111	30.3	27.8
40 to 59 years	206,452	82.5	40.9	218,643	25.9	15.4
60 years or over	87,289	66.1	29.7	74,096	10.4	11.9
Age unknown	962	46.6	40.2	1,484	16.6	17.7
Total	776,601	61.9	45.5	1,336,034	17.7	23.3

There is a considerable difference in the age distribution of the two sexes for employees engaged in industrial pursuits (mining, manufacturing, transportation, and commerce). Of the male employees of known ages 24.9 per cent were under 20 years of age, and of the females 36.3 per cent; 54.8 per cent of the males, and 48.5 per cent of the females were from 20 to 39 years old; 20.3 per cent of the males, and 15.2 per cent of the females were 40 years old or over. Hired labor of aged women is not therefore an unusual occurrence. A comparison of the number of married of each sex shows a large proportion of married women as wage-workers; of all female employees 34.3 per cent were married, and of those 15 years of age or over, 37.0 per cent. Of the female employees 20 to 39 years old, 54.0 per cent were married. This is partly explained by the frequency of husband and wife being employed in the same factories, which furnish lodgings to their married employees.

The male employees have a higher educational standard than the female employees, as 55.4 per cent of all male employees and only 30.5 per cent of the female employees could read and write. The younger employees show a much higher percentage of literacy than the older generation, which indicates a marked improvement of educational facilities.

Among the male employees of known ages in agriculture and rural industries 28.8 per cent were under 20 years of age, as against 24.9 per cent in industrial pursuits; the unskilled labor group had 12.3 per cent under 20 years of age; among the male servants the proportion was 12.5 per cent. It is characteristic that the highest percentage of literacy is not shown by the youngest age groups, but by the group 17 to 19 years; many of the agricultural or unskilled laborers evidently acquired the ability to read and write at a more advanced age than the industrial workers who live in the cities.

The following table shows the household relations for the four large groups of wage-earners:

NUMBER AND PER CENT OF WAGE-EARNERS LIVING ALONE, AS MEMBERS OF FAMILIES, AND AS HEADS OF FAMILIES, BY SEX, 1897.

Industry and relation to household.	Males.		Females.		Total.	
	Number.	Per cent.	Number.	Per cent.	Number.	Per cent.
Mining, manufacturing, transportation, and commerce:						
Living alone	1,622,448	58.4	217,488	48.9	1,839,936	57.1
Living as members of a family	461,005	16.6	197,837	44.4	658,842	20.5
Head of family	693,050	25.0	29,737	6.7	722,787	22.4
Total	2,776,503	100.0	445,062	100.0	3,221,565	100.0
Agricultural pursuits:						
Living alone	1,175,899	59.7	419,483	55.7	1,595,382	58.6
Living as members of a family	275,944	14.0	255,893	34.0	531,837	19.5
Head of family	517,610	26.3	77,794	10.3	595,404	21.9
Total	1,969,453	100.0	753,170	100.0	2,722,623	100.0
Common laborers:						
Living alone	325,622	40.2	113,518	39.8	439,140	40.1
Living as members of a family	143,734	17.8	105,310	36.9	249,044	22.8
Head of family	340,070	42.0	66,594	23.3	406,664	37.1
Total	809,426	100.0	285,422	100.0	1,094,848	100.0
Servants:						
Living alone	483,106	62.2	1,247,357	93.4	1,730,463	81.9
Living as members of a family	35,139	4.5	72,846	5.4	107,985	5.1
Head of family	258,356	33.3	15,831	1.2	274,187	13.0
Total	776,601	100.0	1,336,034	100.0	2,112,635	100.0
All classes:						
Living alone	3,607,075	57.0	1,997,846	70.9	5,604,921	61.3
Living as members of a family	915,822	14.4	631,886	22.4	1,547,708	16.9
Head of family	1,809,086	28.6	189,956	6.7	1,999,042	21.8
Total	6,331,983	100.0	2,819,688	100.0	9,151,671	100.0

The interesting fact brought out by this table is the very large proportion of wage-earners living alone, namely, 57 per cent of the male workers, and 70.9 per cent of the female workers (the latter figure including all the female servants living in the home of the employer); 14.4 per cent of the male wage-earners and 22.4 per cent of the female wage-earners lived at home as members of the family, the latter figure including the working women living with their husbands. The remaining 28.6 per cent of men and 6.7 per cent of women were living in their own households as heads of families. Thus the number of males living as heads of families, 1,809,086, was much smaller than the number of married men, 3,264,930, indicating a very large number of married men living apart from their families. This condition is partly explained by the fact that many workingmen's wives remain in the agricultural villages while their husbands are employed elsewhere; in many such cases the workingmen have not altogether severed their connection with their families. An examination of similar data for each large group of wage-earners shows this condition to be particularly common among the industrial workers.

OPINIONS OF THE ATTORNEY-GENERAL ON QUESTIONS AFFECTING LABOR.

[It is one of the duties of the Attorney-General of the United States to furnish opinions advising the President and the heads of the executive departments in relation to their official duties when such advice is requested. Opinions on questions affecting labor will be noted from time to time under the above head.]

EIGHT-HOUR LAW—APPLICATION TO LOCK TENDERS, ETC.—*Advance sheets, 26 Op., page 605.*—The Secretary of War addressed an inquiry to the Attorney-General "as to whether certain classes of employees, variously designated as lock masters, lock keepers, lock helpers, lockmen, watchmen, firemen, enginemen, stokers, teamsters, etc.," are mechanics or laborers within the meaning of the eight-hour law of August 1, 1892. The reply is reproduced practically in full:

It seems from the inclosed memorandum that, at certain locks and dams, persons are employed whose duties are performed at irregular hours and do not require their attention for eight hours in the calendar day. These employees are liable to be called upon at any hour in the day for a service lasting but a few minutes; but, as a fact, the whole sum of the time in which they are engaged is but a fraction of eight hours. The rest of the day is entirely their own. The question is whether the service and employment of such persons, under such circumstances, is legal and proper within the limit and restriction of the statute.

As to laborers employed in a similar manner, I refer you to what was said by my predecessor, Attorney-General Moody (26 Op., 67):

"But I think that the eight-hour day means eight hours of effective labor, and therefore so far as your questions present the case of laborers and mechanics who, from the exigencies of the situation, must wait until after the completion of the regular day to finish their work, I am of the opinion that the blasting, cleaning of trucks, repair of machinery, and all other similar work essential to prompt and continuous service in the regular day may be legally done before and after the regular hours. To be more specific, laborers and mechanics who are called upon to do two hours' work, for example, before or after the regular day begins or ends have no just cause for complaint that the law is violated if they are only called upon to work six more hours during the regular hours. The law gives no countenance to the conception that the interval between the beginning and end of the regular day is a controlling convention which excludes labor at any other time and entitles workmen to stand around idle if their services can not be fully availed of during that interval. The law limits the working day to eight hours, but it does not prescribe in what hours of the day the work shall be done. Practically, no doubt, there should be a real necessity, as is obviously the case here,

for work during other hours than the regular day; and there should be scrutiny and care lest abuses arise which, however, the right of contract, subject to the law, between laborer and employer ought to prevent."

The cases mentioned in the memorandum of the Judge-Advocate-General come fully within these principles. Under the Cincinnati office are included locks on the Muskingum, Kentucky, and Big Sandy rivers. The employees live at the locks, in Government houses, and none is required to work an aggregate time in excess of eight hours though they are subject to call.

At Milwaukee are included 21 locks at canals of Fox River; the number of lockages averaging less than 2 per day and rarely exceeding 8 for the twenty-four hours.

Other localities at which similar conditions prevail were mentioned, and the opinion continues:

In these cases to require that a sufficient number of men should be employed to prevent any of them from being liable to duty except within a determined and arbitrary period of eight continuous hours would be to put an unreasonable construction upon the statute. It would recognize a favored condition of employment not intended by the law.

A familiar rule is, that where a particular construction of a statute will occasion great inconvenience or produce inequality and injustice, that view is to be avoided, if another and more reasonable interpretation is present in the statute.

Other instances mentioned in the memorandum are upon different footing. At places under the control of the Pittsburg office men are sometimes required to work more than eight hours "when dam is being raised or lowered;" and the service is one "requiring skill and training and could not safely be entrusted to inexperienced men." This does not make a case of extraordinary emergency. The act includes skilled as well as unskilled workmen. The need is for more men; not for the employment during more hours.

At other places, employees are classed as watchmen, dam tenders, custodians, etc. With respect to the legal status of such employees under the eight-hour law, it is impossible to speak with certainty without very full information as to the nature of their employment.

EIGHT-HOUR LAW—APPLICATION TO WATCHMEN, MESSENGERS, ETC.—*Advance sheets, 26 Op., page 623.*—The Secretary of War submitted an inquiry as to the application of the eight-hour law to employees stationed at Washington, D. C., and engaged in certain described duties, to which inquiry the Attorney-General replied as follows:

1. I am of opinion that "a watchman, whose duty is to watch the entrance of one of the public buildings occupied by the War Department, executing instructions with regard to admitting persons into the building and permitting public property to be taken out of the building, reporting to his chief any violation of law, disturbance of the peace, etc., that may be brought to his attention, or to guard the

building and property therein during the night," is not either a laborer or mechanic within the meaning of the eight-hour law.

2. I am of opinion that "a laborer, whose duty is to perform manual labor in the removal of furniture and office fixtures, cutting grass, washing floors and windows, and general office cleaning," is not a laborer within the meaning of the eight-hour law. The services required seem to be more those of a domestic servant than those of a laborer in the usual meaning of the term.

3. I am of opinion that a hostler, "whose duty is to feed, drive, and care for horses, and to clean carriages, harness, and stables," is rather a domestic servant than a laborer within the meaning of the eight-hour law, and therefore not subject to the provisions of that law.

4. I am of opinion that a "messenger, whose duty is to sweep floors and do general office cleaning, attend to fires, and carry messages," is not a laborer or mechanic within the meaning of the eight-hour law.

DECISIONS OF COURTS AFFECTING LABOR.

[Except in cases of special interest, the decisions here presented are restricted to those rendered by the Federal courts and the higher courts of the States and Territories. Only material portions of such decisions are reproduced, introductory and explanatory matter being given in the words of the editor. Decisions under statute law are indexed under the proper headings in the cumulative index, page 1005 et seq.]

DECISIONS UNDER STATUTE LAW.

EMPLOYERS' LIABILITY—EMPLOYMENT OF CHILDREN—VIOLATION OF STATUTE—DEFENSES—DISCOVERING AGE—*Syneszewski v. Schmidt et al., Supreme Court of Michigan, 116 Northwestern Reporter, page 1107.*—Czeslau Syneszewski, a minor, sued by his next friend to recover damages for injuries received while employed in a tannery in violation of the child labor law of the State. Judgment was in his favor in the circuit court of Wayne County, whereupon the defendants appealed, the appeal resulting in an affirmation of the decision of the court below.

The law in question prohibits the employment of children under 14 years of age in manufacturing establishments, or under 16 years of age in dangerous employments. It also requires an age certificate to be procured for children under 16 years of age. Syneszewski was less than 14 years of age at the time of his injury. He was helping his boss clean a machine, when the latter unexpectedly started it and caught the plaintiff's fingers in some cogs, causing the injury complained of. The contentions on which the appeal was based were that the employers were not liable, the injury having been caused by the act of a fellow-servant of the plaintiff; that the court below had erred in refusing to instruct the jury that if the plaintiff had represented himself, at the time he was hired, as being above 16 years of age, and his employers in good faith believed him to be so, they were not liable; and that in any case, it was not their violation of the statute, but the act of the boss that was the immediate cause of the injury. None of these grounds was allowed by the supreme court,

as appears from the following extracts from its opinion, which was delivered by Judge Ostrander:

It is not open to question (Sipes *v.* Michigan Starch Co., 137 Mich. 258, 100 N. W. 447; Sterling *v.* Union Carbide Co., 142 Mich. 284, 105 N. W. 755; Beghold *v.* Auto Body Co., 149 Mich. 14, 112 N. W. 691) that this statute raises a duty to and for the benefit of persons of the classes liable to be injured by its violation. It is the general rule that a civil action is maintainable where the person complaining is of a class entitled to take advantage of the law, is a sufferer from the disobedience, is not himself a partaker in the wrong of which he complains, or is not otherwise precluded, by the principles of the common law, from his proper standing in court. In giving effect to a portion of the statute we are now considering, this court held that the plaintiff did not assume the risk of violation of the statute duty. (Sipes *v.* Michigan Starch Co., supra.) In Sterling *v.* Union Carbide Co. the plaintiff was injured by machinery while doing the work he was employed to do. It was held that "disregard of the inhibition of this statute, by placing the plaintiff at work at an employment where his life or limb was endangered, constituted the negligence or wrong of which plaintiff has the right to complain, and that the causal connection between that wrong and the injury to plaintiff is clear."

It was said, further, that the question of assumption of risk was settled by the case of Sipes *v.* Michigan Starch Co. Upon this point I am not able to distinguish the case at bar and the Sterling case. A distinction sought to be made by counsel rests upon the fact, in the case at bar, that plaintiff was injured by the negligent act of a fellow-servant, that the work he was doing was not in itself dangerous, and that injury would not have resulted but for such negligent act. In the argument counsel fail to give effect to two important facts. In the first place, it was not lawful for defendants to employ plaintiff in their establishment at any work. It is true the trial court did not instruct, and the jury did not proceed, upon this particular inhibition. But the fact is not disputed, and when the law forbids that one shall be employed as a servant, it seems illogical to say that he may be a fellow-servant, or that the employer can be permitted to say that one who, under the terms of positive law, may not be his servant is fellow-servant of his servants. It is only by becoming a servant that the risks of employment, including those arising out of the negligence of fellow-servants, are assumed. In the second place, there was, in this case, what may be termed a "double violation" of the statute. Plaintiff was injured, as was the plaintiff in the Sterling case, while engaged in the work he was set to do. It was dangerous work if his "boss," without warning, set the machine in motion. He did set it in motion, and injury resulted. The negligence of the "boss," who was undoubtedly a servant of the employer, was a hazard of the employment which, if assumed by plaintiff, effectually destroys his right to the enforcement of the statute duty. It was not different, so far as assuming risk is concerned, from the hazard arising from unguarded machinery. And any argument based upon the idea that the injury was caused by a fellow-servant implies that the

rule obtaining in cases where injury is caused by an intervening, independent, responsible, human agency has no application. Appellants' first and last contentions are therefore overruled.

Judge Ostrander then reviewed the testimony as to the representations of the age of the boy, and cited the provision of the law which requires a sworn statement of the age, etc., of children under 16 years of age to be secured as a condition to employment, after which he said:

Some effect must be given to this provision. It is unnecessary to determine whether it is mandatory, or whether a false statement made by a parent would prevent a recovery by a child unlawfully employed. It is a precaution which, in furtherance of the legislative purpose, the employer is, in terms, required to observe. It can not be said that its observance would not tend to prevent unlawful employment of children, and therefore prevent violations of the law. It is calculated, not alone to discover the exact age of children under 16, but, also, whether they are over or under that age. Defendants did not observe it. They say it is not required, if the child is more than 16 years old. But plaintiff was not 16 years of age, and was employed by them, in violation of the statute, without any precaution, except to inquire his age and to judge, from his appearance, that he was telling the truth. His age was in question. They regarded the fact as of importance, and they determined, upon the evidence presented, whether his employment would be lawful or unlawful. It has been suggested that the statute should be construed as providing, in effect, for a certificate and permit from the parents or guardians of children—a construction which is aided by the words employed in the 1905 form of the statute—in the absence of which, so far as the age of the child is concerned, employers hire children at their peril. Whatever force there may be to this suggestion, it is sufficient, for the purposes of this case, to say that all that defendants did they would be, in good faith, required to do in any case. But the statute does not accept the mere statement of a child as to his age, and the court can not aid one who did accept it.

EMPLOYERS' LIABILITY—RAILROADS—BRIDGES OVER TRACKS—DANGER SIGNALS—*Chesapeake and Ohio Railway Company v. Rowsey's Administrator, Supreme Court of Appeals of Virginia, 62 Southeastern Reporter, page 363.*—The plaintiff had secured judgment against the company named for the death of G. W. Rowsey, a brakeman in its employ, in the circuit court of Albemarle County, from which judgment the company appealed. Rowsey's death was caused by his striking his head against a low bridge over the tracks of the railroad, and the suit involved the construction of section 1294–d, clause 36, of the Code of 1904. This section requires danger signals to be erected near low bridges, etc., over the tracks and declares that failure to comply with this law shall make the company liable for

injuries resulting from the insufficient height of the bridge. The danger signals were in place in the present case, but the judgment of the court below was affirmed. As to the construction of the section mentioned, the court said:

The section mentioned was not intended to diminish the liability of railroads, but to increase it. If the railroad whose tracks pass under any bridge, tunnel, or structure not sufficiently high to admit of the safe passage of cars upon the tracks with the servants and employees at their posts of duty on said cars fails to maintain at proper distances on each side of said tunnel or structure warning signals of approved design and in general use, those operating such railroads are made liable in damages for the death or injury of any employee or servant resulting from the insufficient height of such bridge, and no contract, expressed or implied, and no plea of, or defense based upon, the contributory negligence of such servant, shall relieve such railroad from liability. Railroads having the structures denounced by this statute who do not erect the danger signals for which it provides are deprived of all defense, and made liable for whatever injury may have resulted from their conduct. But, where the warning signals are placed, we do not understand that the railroad company is thereby made immune from damages resulting from its negligent act in having a bridge or other structure not sufficiently high to admit of the safe passage of its cars with its servants and employees standing at their posts of duty on said cars.

Public Work—Protection of Laborers and Material Men—Contractors' Bonds—Assignments of Claims—*Title Guaranty & Trust Company v. Puget Sound Engine Works et al., United States Circuit Court of Appeals, Ninth Circuit, 163 Federal Reporter, page 168.*—The trust company named was adjudged liable on a bond to secure the payment of claims for labor and material furnished for the prosecution of public work, in accordance with the act of Congress of August 13, 1894, amended February 24, 1905, 33 Stat. 811. (See Bulletin No. 60, pp. 717, 718.) The work in question was the construction of a steam vessel for the United States. From the judgment of the circuit court the company appealed, raising a number of points, on each of which it was overruled. Only those portions of the opinion which are of interest to labor are reproduced.

Judge Hunt, speaking for the court, said:

The rulings of the court below were, in effect, that, under the terms of the contract entered into, the vessel was a "public work" within the provisions of the statute.

Appellant's counsel earnestly contend that the view of the lower court is erroneous, and argue that the contract of the Puget Sound Engine Works was not for the prosecution or completion of any public work, that title to the vessel did not pass to the government

until completion, delivery, and acceptance, and that the laborers and material men were amply protected by the lien laws of the State of Washington.

The purpose of the original act of 1894 is not altered by the amendment of 1905; nor does the amended act restrict the classes of persons who are entitled to the benefits of the bonds required. As the Supreme Court has said, in comparing the two statutes, the amendment "shows the consistent purpose of Congress to protect those who furnish labor or material in the prosecution of public work." (Hill *v.* American Surety Co., 200 U. S. 197, 26 Sup. Ct. 168.) Undoubtedly, Congress meant to substitute the obligation of the bond required for such a security as can in most cases be obtained by attaching a lien to the property of an individual. By keeping in mind that the intent of the statute is that material and labor actually contributed to the construction of the work shall be paid for, and thus that the material man and the laborer shall be protected, construction of the statute and bond is quite simple.

The statute extends to construction not only of any public building, but to the prosecution and completion of "any public work," and even goes farther by including "repairs upon any public building or public work." There is no limitation that it shall only apply to public works attached to the soil, and where it is agreed that, as fast as any part of the thing upon which the work is being done is completed and paid for under a percentage plan, such completed part becomes the property of the United States, no lien under a State statute could be enforced, and therefore there is no reason for excluding the construction of a vessel from within the definition of a public work.

It is contended that the United States ought to have been made a party to this suit; but the United States failed to institute any suit and failed to assert any rights by intervention. It does not appear to have had any interest in this action. Under the amended act, the United States has a priority under certain conditions: It may protect such prior right by bringing suit on the bond within six months after the completion and final settlement under the contract; but, if no such suit is brought, then a creditor can sue, and all creditors have a right to intervene within a year. It would seem that the United States, having failed to sue, or to intervene in a suit brought, can not claim against the surety by reason of the execution of the bond.

Objection is made to the claims of the Eyres Transfer Company, Chesley Towboat Company, Allmond Company, and Puget Sound Pattern Works, upon the ground that bills for the labor and materials furnished by these several parties are not within the purview of the bond. The Eyres Transfer Company claimed cartage and freight money paid out. It was not a common carrier, protected by its lien on freight carried, but was a local transfer company engaged in the business of cartage and delivering. We can not approve, though, of the claim of the Eyres Company for freight money advanced to the carriers and added to the cartage bill.

The claim of the Chesley Towboat Company was for wharfage. Such a claim seems to be within the reasonable purview of the statute. (United States *v.* Morgan (C. C.) 111 Fed. 474.)

The claims of the Allmond Company and the Puget Sound Pattern Works were for patterns furnished to the molding department of the Puget Sound Engine Works. The patterns were used for the castings which went into the vessel. Why should not those who furnished the patterns be protected as are those who erect the scaffolding upon which carpenters stand, in doing their work upon the actual construction of a ship? We believe they should be.

The point is made that the claims of laborers and material men are not assignable under the act; but in United States, to the Use of Fidelity National Bank of Spokane, *v.* Rundle et al., 100 Fed. 400, 40 C. C. A. 450, the right of laborers and material men to enforce the obligation of the sureties on the bond of a contractor for government work, as required by 28 Stat. 278, was held to be assignable.

Error is assigned upon the action of the court in allowing each of the interveners a statutory fee of $10, taxed as costs. The decision in the case of The Oregon, 133 Fed. 609, 68 C. C. A. 603, sustains the action of the lower court.

It is unnecessary to discuss the other points raised by appellant. We have examined them all and find no reason to reverse the decision.

The judgment will be modified by reducing the amount awarded to the Eyres Company by deducting $55.32, amount of freight money paid. As so modified, the judgment in favor of that particular claimant will be affirmed, and the judgments in favor of all other claimants will be affirmed.

Railroads—Construction of Shelters over Repair Tracks—Constitutionality and Construction of Statute—*St. Louis, Iron Mountain and Southern Railway Company v. State, Supreme Court of Arkansas, 112 Southwestern Reporter, page 150.*—The railroad company named was convicted of violating the law, Act No. 233, Acts of 1905, which makes it "unlawful for any railroad company or corporation, or other persons who own, control or operate any lines of railroad in the State of Arkansas, to build, construct or repair railroad equipment, without first erecting and maintaining at every division point a building or shed over the repair tracks, same to be provided with a floor where such construction or repair [work] is permanently done, so as to provide that all men permanently employed in the construction and repair [of] cars, trucks and other railroad equipment, shall be under shelter during snows, sleet, rain and other inclement weather." An appeal was taken, raising questions as to both the constitutionality and the application of the law. Following is a summary of the evidence as set forth by Judge Hill, who announced the opinion of the supreme court:

Van Buren is a division point on the line of the appellant railroad, and it maintained repair tracks there which were built in 1903. The number of men employed in repair work varied, but a force was regularly employed, and was about 15 or 20 at the time the company was charged with the violation of the act, and usually averaged about that many. There was no building or shed over the repair tracks, nor

a floor where the construction or repair work was done. There was no protection from the weather for employees engaged in this repair work. The repairs usually done were substituting new for broken knuckles, putting in draft timbers, bolsters, end sills, and putting roofs on cars and supplying new trucks and wheels for defective or broken ones. Generally speaking, the work done on these repair tracks was that of putting in missing or defective or broken parts on cars which were necessary to enable the car to keep in transit and component parts of the cars were kept in stock for this purpose, and other light repairs that are necessary to conform to the M. C. B. rules and regulations covering interchange of cars. The repairs done at this point were "running repairs." The shops at Baring Cross, near Little Rock, is where the general and permanent repair and construction work of the company is done for the territory in which Van Buren is situated.

The act was upheld, and the judgment of the lower court affirmed, as appears from the quotations from the opinion given herewith:

Two questions are presented on appeal: Does the act apply to the conditions shown to exist at Van Buren? Does the act violate the Constitution of the United States or the constitution of Arkansas?

1. The jury found, and correctly, under the facts, that the work done at Van Buren on the repair tracks was such as was contemplated by the act. The use of the word "permanent" in the act is inapt. The first use of it, "where such work is permanently done," means "constantly"; and "constant" is one of its synonyms. The second use of it, "all men permanently employed" in the repair of cars, is equivalent to "all men regularly employed." Taking the act as a whole, and reading it in connection with its title and the evident purpose thereof, its meaning is reasonably clear. It is the duty of the court to disregard inapt words used, and to enforce it according to its intent gathered from the whole act, and not from any particular word or words therein. Even if the literal use of the word "permanent" is accepted, the work done at Van Buren is within it, for repairs which were made there were usually as permanent as those made elsewhere. For instance, as one of the witnesses illustrated, if a sill was put in, it was as permanent as if done at Baring Cross. But this literal interpretation was not intended by the legislature.

2. Was the act constitutional? The contention of counsel is thus stated: "A brief analysis of the act discloses its fatally arbitrary classification. It applies only to any railroad company or corporation or other persons who own, control, or operate any lines of railroad in the State of Arkansas engaged in the building, construction, or repair of the railroad equipment at every division point. Any other corporation or other person engaged in the building, construction, or repair of railroad equipment within this State may avoid the burden imposed by this act and engage in the building, construction, or repair of railroad equipment without limit and compel those engaged in this work to pursue their labor without shelter during snow, sleet, rain, and other inclement weather." It is not shown here, as it was in Cotting *v.* Kansas City Stockyards Co., 183 U. S. 79, 22 Sup. Ct. 30, 46 L. Ed. 92, that as a matter of fact the law operated only upon one corporation, although others in like and similar conditions were

not affected by it, owing to a classification based entirely upon volume of business. Nor was shown here, as in Yick Wo *v.* Hopkins, 118 U. S. 356, 6 Sup. Ct. 1064, 30 L. Ed. 220, that, although fair on its face, yet the practical operation of the law made it fall unequally upon persons similarly situated. The contention here is that the act shows upon its face an arbitrary selection of railroad corporations who own, control, and operate lines of railroad in the State engaged in the building, construction, or repair of railroad equipment at division points to bear the burden imposed, and excludes by this selection any other persons or corporations who may be engaged in the construction, building, or repairing of railroad equipment. It is stated at the bar that there are no such corporations or persons engaged in such business in this State, and, so far as the court knows from such sources as it is proper for it to take information, this statement is true.

It is asserted, and probably the court could take cognizance of it as a matter of common knowledge, that there are persons and corporations in other States engaged in the building, construction, and repair of railroad equipment who do not own or operate any lines of railroad. The argument is that under this act it is possible for a commercial corporation or private individual to engage in this business in Arkansas, and, when that happens, which may occur at any time, then the act will fall unequally upon persons similarly situated and engaged in like occupations, and thereby be offensive to the equal protection of the law provision. The court in Williams *v.* State, 108 S. W. 838, said: "The legislature in framing this statute met a condition which existed, and not an imaginary or improbable one." While it is not improbable that some commercial corporation may engage in this business in this State, yet that is an imaginary objection to the operation of the act, and it was "a condition, not a theory," which called forth this legislation. The court is unable to find the classification here made offensive to the equality clause of the Constitution as construed by the Supreme Court of the United States, whose decisions are binding on this subject.

Suits for Wages—Attorneys' Fees—Constitutionality of Statute—*Chicago, Rock Island and Pacific Railway Company v. Mashore, Supreme Court of Oklahoma, 96 Pacific Reporter, page 630.*—This was an action by W. F. Mashore to recover a sum of money due for labor, and also, under paragraph 6915, Wilson's Revised and Annotated Statutes, to recover an attorney's fee, which that statute allows where there is a successful suit for wages. The case itself is not of interest here, but the provision as to the attorney's fee was called in question and was declared unconstitutional, as appears from the following opinion of the court, which was delivered by Judge Dunn:

The statute providing the assessment of attorney's fees in cases of this character is violative of the fourteenth amendment of the Constitution of the United States, in that it does not give to all parties the same, equal protection of the law. The defendant, being sued for

wages under this statute, is not on an equal footing with the plaintiff. If he makes an unsuccessful defense, he is mulcted in an attorney's fee, to be paid to the plaintiff, while if he is successful, the plaintiff is not required to pay any attorney's fee to him. In other words, justice is not dispensed, with an impartial and equal hand, to these litigants. A court is always loath to hold a statute, the solemn act of the legislature, unconstitutional and void, and never does so, except where its provisions make this duty a plain and imperative one. In the present case we have examined a large number of authorities wherein the constitutionality of such statutes has been raised, and in every one of them the court of last resort has held it unconstitutional.

A number of cases were then cited, after which the court concluded:

From the foregoing authorities it will be seen that our statute providing for recovery, in suits for personal services rendered by a laborer, clerk, servant, nurse, or other person, an attorney's fee not to exceed $15, to be fixed by the court, is in conflict with the fourteenth amendment to the Constitution of the United States, in that it denies to the defendant the equal protection of the law.

DECISIONS UNDER COMMON LAW.

INJUNCTION—VIOLATION—CONTEMPT—PERSONS NOT PARTIES TO ORIGINAL BILL—NOTICE—NATURE OF PROCEEDINGS—*Garrigan v. United States, United States Circuit Court of Appeals, Seventh Circuit, 163 Federal Reporter, page 16.*—Daniel Garrigan was adjudged guilty of contempt in the United States circuit court for an alleged violation of an injunction issued during the teamsters' strike in Chicago in 1905, and was sentenced to a term of imprisonment. From this judgment Garrigan appealed, and secured a reversal of the judgment of the lower court. The injunction in question had been secured by the Employers' Teaming Company, and was directed against certain organizations and individuals named, and the proceedings in the court below were at the instance of this company.

The evidence on which conviction was obtained, and the principles of law involved showing the grounds of reversal, are set forth in the opinion of the court, which was delivered by Judge Seaman, and which for the most part is reproduced herewith:

The plaintiff in error was not a party to the bill filed by the Employers' Teaming Company for injunctional relief, nor a member of either of the associations named as defendants therein, nor named in the restraining order whereof violation is averred in these contempt proceedings, and neither averment nor proof appears of his relation to or privity with either of the parties enjoined, prior to or apart from the alleged acts in violation and contempt of such order. Thus the proceedings and conviction which are brought for review under this writ of error are distinctly criminal in their nature, and reviewable in conformity with the established doctrine of such procedure. (Besette *v.* W. B. Conkey Co., 194 U. S. 324, 326, 24 Sup. Ct. 665; Matter of Christensen Engineering Co., 194 U. S. 458, 459,

24 Sup. Ct. 729.) Whatever of confusion appeared in the authorities, prior to the decisions above cited, as to the distinction in contempt proceedings between those of civil and criminal nature—the one remedial for the benefit and enforcement of the rights of parties to a suit, and the other to punish for acts in contempt of the power and dignity of the court—that classification has become the settled rule for testing the nature of the proceeding and reviewable questions.

The proceedings against the plaintiff in error were instituted by a petition filed by the Employers' Teaming Company, as complainant in the above-mentioned bill, averring, in substance, the issuance of the injunctional order referred to, its wide publication in newspapers in Chicago, and posting conspicuously on all the wagons of complainant which were engaged in the operation described, and stating "upon information and belief that each of the persons hereinafter named as respondents to this, its said petition, did at the time of the commission of the acts hereinafter complained of have full knowledge and notice of the issuance of said temporary stay or injunctional order, and knew, or by the exercise of ordinary intelligence might have known, of the issuance of said injunctional order." An answer was filed by the plaintiff in error, under a rule entered and served to show cause why he should not be adjudged guilty of contempt and after raising various objections to the petition and proceeding, which denies under oath commission of the several acts and offenses charged in the petition and affidavits, and denies knowledge or notice of the injunction, or violation thereof "intentionally or otherwise."

The evidence upon which the conviction rests appears in a bill of exceptions, and consists mainly of ex parte affidavits, purporting to be made by witnesses of the occurrences in controversy—with a single witness, one Dimick, produced and testifying in open court—which affidavits were submitted on behalf of the parties respectively. In the opinion filed by the trial court it is aptly remarked that the opposing affidavits, "as is usual in such controversies, were directly contradictory of each other;" and that, in "such irreconcilable conflict of testimony, it is often impossible to get a clue to the truth." While these affidavits concur in proving a case of mob violence during the attempted movement of complainant's teams and wagons through the streets of Chicago, and riotous interference with the persons guarding them, those introduced for the prosecution and defense are "directly contradictory" in all the facts bearing upon the issues involved, both in respect of the conduct of the parties, collectively and individually, engaged in the riot, and of the part and conduct of the plaintiff in error therein. Assuming, without deciding, that it was within the discretion of the trial court to hear the case upon such affidavits, instead of ascertaining the facts from testimony taken in open court, as was the course adopted in the Savin Case, 131 U. S. 267, 268, 9 Sup. Ct. 699, and mentioned as of course in United States *v.* Shipp, 203 U. S. 563, 575, 27 Sup. Ct. 165, the facts to authorize conviction must nevertheless be clearly established, and the affidavits introduced here exemplify the infirmity of such ex parte means for the "legal understanding" of facts in controversy intended by the rules of evidence.

In any view of the charges of contempt and evidence so received, it is unquestionable that the only issues of fact were: (a) Whether the accused had knowledge of the injunction; and if such knowledge

appeared, whether he committed acts, either (b) in aid of its violation by the parties enjoined, or (c) in plain defiance of its terms—and thus in contempt of the authority and commands of the court. As it is neither charged nor proven that the plaintiff in error was one of the parties enjoined, he is not chargeable for breach or violation of the injunction, in the well-recognized sense of those terms applicable to parties. He was bound, alike with other members of the public, to observe its restrictions when known, to the extent that he must not aid or abet its violation by others, nor set the known command of the court at defiance, by interference with or obstruction of the administration of justice; and the power of the court to proceed against one so offending and punish for the contemptuous conduct is inherent and indisputable. (Seaward *v.* Paterson, 1 L. R. Ch. Div. (1897) 545, 554, 76 Law Times (N. S.) 215; In re Reese, 107 Fed. 942, 47 C. C. A. 87, 90.) We believe the above-mentioned distinction in contempt proceedings, between disobedience of the injunction by parties and privies and the conduct of others in contempt of the authority and commands of the court, to be elementary, and the sufficiency of the evidence in the case at bar to support conviction must be tested thereunder. The question discussed in the briefs, whether the general averment in the petition that the plaintiff in error "violated said injunctional order," authorized reception of this evidence to establish either class of contempt relied upon for conviction, is not involved in our view of the effect of the affidavits, incorporated in the petition, that they aver such facts and furnish notice for the introduction. The petition is plainly defective, however, in the averments to charge the plaintiff in error with knowledge of the injunction—stating alternatively that he "knew, or by the exercise of ordinary intelligence might have known, of the issuance"—but laying out of view for the present inquiry the objection raised thereupon, we proceed to consideration of the versions of fact on which the finding and conviction are predicated, to ascertain their bearing and sufficiency.

The present proceedings arose out of notorious conditions of mob violence which attended a strike in Chicago, known as the "teamsters' strike," in April and May, 1905. While the "contempt proceeding is sui generis," it is distinctly criminal in its nature (Bessette *v.* W. B. Conkey Co., supra), and the accused is clearly entitled to the benefits of the common-law presumption of innocence, with its strict requirement of proof for conviction, although the pleadings may not be subject to the technical rules of the criminal law.

Taking up the affidavits introduced in support of the charges of contempt, they plainly state a vicious attack upon two teams of the complainant and the persons attending as guards, by a mob and individuals named, for the manifest object of obstructing the teams and injuring the guards. They identify the plaintiff in error as one of the assailants, "in the uniform of a city fireman," and state: That he was following up the teams and guards, in their passage through the street; that he was observed "throwing stones at the colored men guarding the teams," was swearing at the guards, "calling vile names," and cried out to the crowd, to "hang the damned niggers;" and that he ultimately assaulted and struck one of the guards, after such guard was arrested by the city police force, was in their custody and either in a police wagon or "getting into it." The single witness,

Dimick, called to testify upon the hearing, states only the last-mentioned assault upon the guard so arrested and in custody in the police wagon. These versions of fact, in substance—without a fact stated to connect the mob violence or individual attacks with parties named in the injunction, either as associations or individuals, or with express defiance of such injunction, and with no proof tending to show knowledge of the injunction or intent to defy its commands, aside from the alleged publications of the order in the public press and notices thereof borne upon the wagons thus interfered with—constitute the evidence upon which the plaintiff in error is adjudged guilty of contempt. On the part of the plaintiff in error, his presence when the conflict occurred is admitted, but his testimony is specific in denial of every act of violence or participation above mentioned, and he states, in substance, that his only part in the disturbance was to assist "the police to protect life and property," and that he did so assist in quelling the riot and arresting rioters, in conformity with his understanding of his duty, as one of the city firemen. This version is supported by several affidavits, by policemen and other witnesses, and subsequent proceedings in the criminal court were introduced by way of corroboration.

The findings by the court stated in the judgment are in general terms, in effect, that plaintiff in error, (a) with full knowledge of the injunction, (b) did willfully and in violation of its terms interfere with, "and aid and abet the defendants, or some of them, to said bill," in interfering with "the business of said the Employers' Teaming Company" and its employees and agents engaged therein, and (c) that he "has failed to show cause why he should not be attached and punished as for contempt."

We are of opinion that each of the findings is unsupported, in any admissible view of the facts so established. The finding that the plaintiff in error had "full knowledge of the injunction"—a fundamental requisite for either charge of contempt—rests alone on the alleged publicity of the issuance, through newspapers and notices thereof which were posted on the wagons intercepted by the mob. No testimony appears of word or action on the part of the plaintiff in error, or in his hearing, in reference to the injunction; nor that his attention was directed to the wagons, their contents, or any notices thereon. He is clearly entitled to the benefit of "the presumption of innocence, as evidence in favor of the accused, introduced by the law in his behalf" (Coffin *v.* United States, 156 U. S. 432, 458, 460, 15 Sup. Ct. 394, reaffirmed in the recent opinion of this court in Dalton *v.* United States, 154 Fed. 461, 83 C. C. A. 317), which arises alike in respect of notice and conduct, as "an instrument of proof created in his favor;" and the mere inference of "full knowledge," derived solely from the above-mentioned facts, is without force, as we believe, to overcome the express denial of knowledge on the part of the accused, fortified by the presumption thus defined. The finding of such knowledge therefore is unsupported by the needful proof to authorize conviction and can not be upheld under the foregoing view. So the question whether the insufficient averment thereof in the petition constitutes reviewable error does not require solution.

Upon these premises therefore, that knowledge of the injunction is unproven, and that no proof appears that the plaintiff in error was engaged by or with any person or association enjoined in its violation,

we are of opinion that the evidence fails to establish cause for his conviction of contempt of court, within either of the classes found and adjudged against him. The misconduct stated by the witnesses for the prosecution—in assailing and abusing the guards, who were protecting the movement of the teams, and inciting the mob to like interference—however criminal in its nature and disturbing in purpose and effect, thus standing alone, does not constitute contempt within either definition of such offense. Willful defiance and contempt of the authority and order of the court can not be intended or committed without information that such authority has been exercised in the issuance of an injunction protecting the movement and services thus interfered with. Nor is the alleged misconduct brought within the finding of violation of the order, in aiding or abetting "the defendants, or some of them, to said bill of complaint, in committing the acts and grievances complained of," for the further reason that it does not appear in evidence that any such parties were engaged in the attack, directly or indirectly. In reference to the alleged subsequent assault upon one of the guards, when such guard was under arrest and in the custody of the police authorities, we deem it sufficient to remark that the guard was not then serving as escort, and any offense then committed was against the dignity of the State, and not that of the court issuing the injunction.

For want of evidence that the plaintiff in error was guilty of contempt of court in his alleged misconduct, the judgment of the circuit court is reversed, with direction to discharge the rule against the plaintiff in error.

STRIKES—INJUNCTION—PICKETING—INTERFERENCE WITH EMPLOYMENT—*Jones et al. v. E. Van Winkle Gin & Machine Works, Supreme Court of Georgia, 62 Southeastern Reporter, page 236.*—Certain employees of the company named became dissatisfied and left its employment, whereupon a demand was made by a local lodge of the International Association of Machinists for certain changes in the conduct of the company's business. This demand was not complied with, whereupon a strike was declared. Picketing and threats followed, and the company secured an injunction from the superior court of Fulton County, from which order an appeal was taken to the supreme court, which affirmed the order with some modifications.

The facts involved and the principles of law applied are set forth in the following extracts from the opinion of the court, which was delivered by Judge Evans:

After hearing evidence, the defendants were "enjoined from placing themselves, their agents or confederates, near the approaches to the petitioner's premises described in the petition and adjoining thereto to induce persons working for petitioner not to work for it, and persons seeking employment by petitioner not to enter petitioner's employment, by threats of violence, intimidation, or persuasion, until the further order of the court." Exception is taken to the judgment in its entirety, and specially to so much thereof as forbids the defendants from placing themselves in or near the premises of the

plaintiff for the purpose of persuading persons not to enter the plaintiff's employment, or to quit the same, so long as the entrances to the plaintiff's premises were not obstructed, and so long as violence, force, and intimidation were not used. The points raised by the demurrer were not argued in the brief, but only the legality of the decree and the sufficiency of the evidence to support it.

The lawfulness or unlawfulness of "picketing" has been the subject-matter of discussion in a large number of cases in this country. In the absence of statutes, courts have drawn from the elemental principles of the common law certain standards by which this modern factor used by labor unions as a means of settling controversies between employer and employees must be regulated. When strikers patrol the streets and approaches of the premises where the strike is in progress, and their number is so great, or their conduct is such, as to intimidate and coerce the employees into quitting their employment, or others from seeking employment, they are guilty of unlawful acts, and will be enjoined from a continuance of them. Sometimes the number of strikers engaged on the patrol may be so great that those intended to be affected by the demonstration will be intimidated by the number of the strikers or their sympathizers without special overt acts. The courts have repeatedly held that the assembling of strikers around the establishment of the employer in such numbers as will serve as a menace to those employed, or the keeping of patrols in front of or about the premises of the employer, accompanied by violence or any manner of coercion to prevent others from entering into or remaining in his service, will be enjoined.

It is a penal offense in this State to attempt by threats, violence, intimidation, or other unlawful means to prevent any person from engaging in any lawful employment, or to hinder, by such means, any person from employing laborers. But a court of equity is not ousted from the exercise of its peculiar functions of preventing irreparable damage merely because, in exercising such functions, it may also prevent the commission of a crime. The court does not interfere to prevent the commission of crime, although that may incidentally result, but it exerts its force to prevent individual property from destruction, and ignores entirely the criminal feature of the act. And Mr. Pomeroy (6 Pom. Eq. Jur. 619) says that "it is everywhere the rule, following the general principle in equity, that where there is ground for equitable interference, as where an irreparable injury is threatened to property, the fact that the act is also a crime is not a reason for refusing an injunction." This principle was recognized and applied by this court in the case of an indictable nuisance. (Mayor of Columbus *v.* Jaques, 30 Ga. 506.) So it is no reply to the invocation of the equitable remedy to prevent irreparable injury to property that the acts which cause the damage may also be indictable.

As already said, members of a labor union, either individually or as an association, have no right by force, menace, or intimidation to prevent others from working upon such terms as they are willing to accept, or to hinder by such means any person from employing laborers. In many cases it may be difficult to draw the line of demarcation between intimidation and inoffensive persuasion. In a New York case (Rogers *v.* Evarts [Sup.] 17 N. Y. Supp. 264) it was

said: "It may be impossible to lay down a general rule as to what surrounding circumstances will characterize persuasion and entreaty as intimidation. Each case must probably depend upon its own surroundings. But, where evidence presents such a case as to convince the court that the employees are being induced to leave the employer by operating upon their fears rather than upon their judgments or their sympathy, the court will be quick to lend its strong arm to his protection. Rights guaranteed by law will be enforced by the court, whether invoked by employer or employee." The very word "picket" is borrowed from the nomenclature of warfare, and is strongly suggestive of a hostile attitude towards the individual or corporation against whom the labor union has a grievance. But the law does not forbid employees who have quit their employer from using legitimate argument to induce others to refrain from taking their places. The current of authority is that a court of equity will not enjoin employees who have quit the service of their employer from attempting to persuade, by proper argument, others from taking their places, so long as they do not resort to intimidation or obstruct the public thoroughfares. [Cases cited.]

The court then reviewed some of the evidence, citing some of the remarks of the pickets, and said:

These and similar threats, and the constant surveillance of the plant by the pickets, caused other departments of the plaintiff's plant to shut down for lack of machinists. At this juncture of affairs the defendants were restrained by a temporary order from interference with the plaintiff's business; and after the grant of the restraining order, according to the testimony of the superintendent, "everything has assumed a different attitude, and a feeling of rest and confidence has taken place which did not exist while the premises were picketed." The quoted remarks of the strikers to the men who were seeking work were more than a peaceable and argumentative presentation of their grievance. The language implied a threat of harm, and the warning to stay out, if unheeded, might be attended with hurtful consequences. The language of these pickets was clearly intimidative, and tended to coerce compliance with their request not to work for the plaintiffs: and there was no error in enjoining such conduct. The form of the injunction is perhaps too broad, in that the strikers are enjoined from using all form of persuasion. As we have pointed out, it was not unlawful for the strikers to use legitimate argument and moral suasion in presenting their case to those who offered to take their places, so long as it is neither coercive and intimidating in character. In affirming the judgment, direction is given to so amend the decree as to make it accord with the opinion of the court in this particular.

LAWS OF VARIOUS STATES RELATING TO LABOR ENACTED SINCE JANUARY 1, 1904.

[The Tenth Special Report of this bureau contains all laws of the various States and Territories and of the United States relating to labor in force January 1, 1904. Later enactments are reproduced in successive issues of the Bulletin, beginning with Bulletin No. 57, the issue of March, 1905. In the cumulative index, page 1005 et seq., are indexed all laws found in the Tenth Special Report, together with those enacted since January 1, 1904, and published in Bulletin Nos. 57 to 79, inclusive.]

TENNESSEE.

ACTS OF 1907.

CHAPTER 256.—*Hiring out children to support parents in idleness.*

[See Bulletin No. 73, p. 799.]

CHAPTER 308.—*Employment of women and children—Hours of labor.*

[See Bulletin No. 73, p. 799.]

CHAPTER 540.—*Mine regulations.*

SECTION 1. Section 1 of * * * [chapter 237, Acts of 1903] is hereby amended so as to add at the end of said section the following: "Immediately after the passage of this act there shall be appointed in the same manner as now provided for the appointment of the present district mine inspectors an additional district mine inspector, who shall hold his office for a period of two years from date of appointment, and thereafter until his successor is elected and qualified. Said additional district mine inspector must have a general knowledge of the conduct of the mining business, and shall, in addition to such qualifications, be thoroughly familiar with the work necessary in the compilation of mining statistics. He shall receive a salary of ($1,700) seventeen hundred dollars per annum and the same traveling expenses as that allowed other district mine inspectors under section 8 of said act, to be paid in the same manner, and he shall be subject to the same rules and regulations as now provided or may hereafter be provided for other district mine inspectors."

SEC. 2. Section 7 of said act [shall] be amended so as to add at the end of section 7 the following: "In order that such full and complete statistics as, in the opinion of the chief mine inspector, is essential for the promotion of the mineral industry of Tennessee, may be obtained and published in said annual report, each and every person, firm, company, or corporation engaged in the mining, quarrying, or production of coal, cobalt, copper, fluorspar, gold, iron, ores, lead, lime, manganese, mineral waters, natural gas, petroleum, phosphate rock, platinum, sand and gravel, sand, lime, brick, silver (mines report), stone, including limestone, sandstone, and marble, or other stone, zinc, gypsum, ocher, pyrites, salt-clay products, slate, or other minerals, or engaged in the manufacture of coke, brick, coal tar, lime, pig iron, ammonium sulphate, gas coke, Portland and natural cement, grindstone, metallic paint and mortar colors, flint, and all other by-products of any minerals produced in this State, shall, on or before January 15 of each year, make out and send to the chief mine inspector upon blanks, to be by him furnished and sent out for that purpose, detailed annual report, giving such statistics and information concerning the output of said mines or plant, the tonnage, number of employees, and the number of days worked. It is thereby declared a misdemeanor for any person, firm, company, or corporation to fail or refuse to furnish the chief mine inspector any and all information called for for said annual report, as above provided, on or before the fifteenth day of January of each year; and any all parties or agents so failing or refusing to furnish said reports within the time specified shall, upon conviction, be fined one hundred dollars for each day of delay, said fine to go

to the State of Tennessee. And it is hereby made the duty of the chief mine inspector to report said failure to the district attorney-general of the district where the mine, quarry, or other works are situated; and in the event of the failure of any such parties to furnish such information, it shall be the duty of the chief mine inspector to call upon such party and inspect such books and records of said firm or corporation or company as will give him the information above provided for; and such person, firm, or corporation shall be required to permit examination of all necessary books or records as will enable the chief mine inspector to obtain the information above provided for, such inspection to be made at its chief office and at any reasonable time; and their failure to permit such inspection shall be a misdemeanor and finable as above provided."

SEC. 4. Section 14 of said act [shall] be amended so as to read as follows:

Sec. 14. For the purpose of the examination of applicants for certificates of qualification the chief mine inspector and district mine inspectors provided for in this act be, and are hereby, constituted a board of examiners, of which the chief mine inspector shall be the chairman. Said board may hold meetings at such times and places for the examinations of applicants for the position of mine foremen, gas bosses, etc., as in its judgment may be most convenient. Said board shall have power to make such rules and regulations for the conduct of said examinations as in its judgment may seem proper for ascertaining the qualification of the applicants, and shall conduct all examinations in the presence of the majority of its members. Said board shall report its action to the secretary of state, and majority of same shall certify to the qualification of each applicant who satisfactorily passed the examination, and shall serve without compensation. The chief mine inspector is hereby authorized and empowered to revoke and annul the certificate of any foreman or assistant mine foreman or gas boss or other foreman or bosses issued under this act upon satisfactory evidence appearing to him that the holder of said certificate is or has been guilty of negligence in the performance of his duties, immoral conduct, or his wanting in integrity, and upon the revocation of such certificate the chief mine inspector shall make a record of same in his office, and shall immediately certify the same to the secretary of the state, who shall record said revocation upon a book containing copy of certificate issued. The chief mine inspector shall notify the holder of such revoked certificate of said revocation, and the holder of said certificate shall immediately surrender the said revoked certificate to the chief mine inspector, to be by him turned over to the secretary of state for cancellation. Should the holder of said revoked certificate fail or refuse to surrender the same as herein provided, he shall be deemed guilty of a high misdemeanor, and, upon conviction, be fined not less than one hundred dollars ($100) and be imprisoned not less than three months nor more than eleven months in the county jail or workhouse: *Provided*, Any foreman, assistant mine foreman, gas boss, or other foreman or boss whose certificate has been revoked as herein provided may, within ten days after receipt of the notice of revocation herein provided for, notify the chief mine inspector of his desire to be reinstated and have said order of revocation annulled; and if at the time he shall execute bond, payable to the State of Tennessee, with good and sufficient security, conditioned to pay the costs incident to the proceeding, in the event he is unsuccessful in his efforts to be reinstated and set aside the order of revocation, it shall then be the duty of the chief mine inspector to fix a day, not later than ten days from such written demand, [and a place,] which place shall be within the civil district where the party whose license is revoked lived at the time of the revocation, and at said time and place the chief mine inspector shall appear and hear such legal evidence as may be offered by such aggrieved party, as well as such legal evidence as may be offered in favor of the order of the chief mine inspector revoking his license, which evidence shall be reduced to writing, and upon such evidence said chief mine inspector shall pass judgment, either affirming the order of revocation of the chief mine inspector or reversing the same; and in the event the order of the chief mine inspector is reversed, such party shall be reinstated. The written testimony taken in the case shall be preserved by the chief mine inspector as a part of the records of his office: *Provided*, That either party may take the case from the action of the mine inspector made on said written evidence before the judge of the circuit court of the county where said trial is had by writ of certiorari prosecuted within twenty days from the date of the judgment of said inspector; and in the event of such action, the chief mine inspector shall cause a certified copy of all the evidence, as well as the original order of revocation and his order

thereon, made on said written evidence, certified by him as a true and correct copy of same, to be filed in the office of the clerk of the circuit court where the said petition for certiorari is filed, and the case shall thereupon stand for hearing before the judge of said circuit court upon such certified record at the next term of the court after the filing of same. The writ of the certiorari in such cases may be granted by any judge of the State on proper petition being presented to him therefor, and upon the execution of a bond for the costs of the petition in the event that the same is prosecuted by the party whose license is revoked, the circuit judge shall pronounce judgment on said certified copy, either affirming the action of the mine inspector or revoking and setting aside the same. In all trials of cases of this kind before the circuit court the mine inspector shall be represented by the district attorney-general, and the party whose certificate has been revoked shall be entitled to have counsel to represent him as in other matters of litigation. In the event the party seeking to be reinstated is unsuccessful in his contention, judgment shall be rendered by the chief mine inspector in the first instance against said party and the sureties on the bond filed for that purpose for all costs incident to the proceeding and by the circuit judge for all costs incident to the prosecution of the writ of certiorari. If the action of the chief mine inspector is annulled and set aside, either by the inspector or by the circuit judge, then the costs of the proceeding shall be certified by the clerk and the judge and the attorney-general to the comptroller of the State for payment out of the appropriation for the support of the mining department of the State.

SEC. 5. Section 15 of the said act [shall] be amended so as read as follows:

Sec. 15. Said certificate shall contain the full name, age, and place of birth of the applicant, also the length and nature of his previous experience in and about coal and other mines, and the secretary of state shall, without cost, keep a record in his department of all the certificates issued. Before the issuance of certificates to any applicant the applicant must give satisfactory evidence to the board of examiners of his good conduct, honesty, capability, and sobriety, and shall pay the said board of examiners for the use and benefit of the State the following fees: For conducting the examination (to be paid for when the examination is held), five dollars ($5); for the issuance and registration of the certificate, five dollars ($5), to be paid for when issued. All fees collected by virtue of provisions of this section shall be reported and paid into the state treasury at the end of the month during which said collections are made by the board of examiners, to be placed to the credit of the mining department.

SEC. 6. So far as section 35 of said act fixed fees for the inspection of mines it is hereby amended so as to provide for the following schedule of fees for the use of the State: Mines employing an average of 100 inside employees or over, $35; mines employing an average of 75 to 99 inside employees, $30; mines employing an average of 50 to 74 inside employees, $25; mines employing an average of 25 to 49 inside employees, $20; mines employing an average of 15 to 24 inside employees, $15; mines employing an average of 10 to 14 inside employees, $10; mines employing an average of less than 10 inside employees, $5.

SEC. 7. Section 20 of said act [shall] be amended so as to strike out after the word "expedient," in the latter part of same, the following words: "*Provided, further*, That said mine foreman shall not be subject to the control of the operator or owner in the discharge of the duties required of said mine foreman by this act," and said mine foreman is hereby expressly declared to be the agent or representative of the operator or owner of the mine in the discharge of the duties required of said mine foreman by this act.

SEC. 8. Section 21 of said act [shall] be amended by striking out the following words at the end of said section: "*Provided*, The said gas boss shall not be subject to the control of the owner or operator in the discharge of any of the duties required of said gas boss by this act," and said gas boss is hereby expressly declared to be the agent or representative of the operator or owner of the mine in the discharge of the duties required of said gas boss by this act.

Approved April 15, 1907.

CHAPTER 541.—*Intelligence offices.*

SECTION 4. Each vocation, occupation, and business hereinafter named in this section is hereby declared to be a privilege, and the rate of taxation on such privilege shall be as hereinafter fixed, which privilege tax shall be paid to the county court clerk as provided by law for the collection of revenue.

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INTELLIGENCE OFFICES AND EMPLOYMENT AGENCIES.

Each office, per annum $10.00

Approved April 15, 1907.

CHAPTER 593.—*Public printing to be done within the State.*

SECTION 1. Whatever printing is done by order of the legislature, or in pursuance of a law, for the State, is public printing, such as the printing of the journals and acts of the legislature, or whether it be in the shape of job work, [and] shall be done within the boundaries of the State: *Provided*, The printing can be contracted for and done in Tennessee as cheaply as elsewhere.

Approved April 15, 1907.

TEXAS.

ACTS OF 1907.

CHAPTER 32.—*Railroads—Headlights for locomotives.*

SECTION 1. It shall be the duty of every railroad corporation or receiver or lessee thereof, operating any line of railroad in this State, within six months after the passage of this act, or within such additional time as may be prescribed by order of the railroad commission of Texas, after a proper showing of their inability to comply by the railroad has been made, to equip all locomotive engines used in the transportation of trains over said railroad with electric headlights of not less than 1500 candlepower, measured without the aid of a reflector, or other headlights of not less than 1500 candlepower, measured without the aid of a reflector: *Provided*, That this act shall not apply to locomotive engines regularly used in the switching of cars or trains.

SEC. 2. Any railroad company or the receiver or lessee thereof, doing business in the State of Texas, which shall violate the provisions of this act, shall be liable to the State of Texas for a penalty of not less than one hundred dollars, nor more than one thousand dollars for each offense, * * * .

Approved March 20, 1907.

CHAPTER 41.—*Sufficient crew required for railroad trains.*

SECTION 1. It shall be unlawful for any railroad company doing business in the State of Texas to run over its road, or part of its road outside of the yard limits, any passenger train with less than a full passenger crew, consisting of four persons, one engineer, one fireman, one conductor and one brakeman.

SEC. 2. It shall be unlawful for any railroad company doing business in the State of Texas to run over its road, or part of its road, outside the yard limits, any freight train, gravel train or construction train with less than a full crew, consisting of five persons, one engineer, one fireman, one conductor and two brakemen.

SEC. 3. It shall be unlawful for any railroad company doing business in the State of Texas to run over its road, or part of its road, outside of the yard limits, any light engine without a full train crew, consisting of three persons, one engineer, one fireman and one conductor: *Provided*, That nothing in this act shall be construed as applying in the case of disability of one or more of any train crew while out on the road between division terminals, or to switching crews in charge of yard engines or which may be required to push trains out of yard limits.

SEC. 4. Any railroad company doing business in the State of Texas which shall violate any of the provisions of this act shall be liable to the State of Texas for a penalty of not less than one hundred dollars or more than one thousand dollars for each offense, * * * .

Approved March 25, 1907.

CHAPTER 51.—*Hours of labor of employees on railroads.*

SECTION 1. It shall hereafter be unlawful for any corporation or receiver operating any line of railroad in whole or in part in this State, or any officer, agent or representative of such corporation or receiver to require or knowingly

permit any conductor, engineer, fireman, brakeman, train dispatcher or telegraph operator, who has been on duty for fourteen consecutive hours to perform any work until he has had at least eight hours off duty, except in cases where such fourteen hours expires while a train is between stations or at a station where there are no facilities for sidetracking such train, in either of which events the conductor, engineer, fireman, or brakeman, or all of them, may be permitted to proceed with such train to the first station where such facilities can be had, but no further: *Provided, however*, That in case said fourteen hours shall expire when a train is within twenty miles of a terminal toward which it is going, or within twenty miles of its destination, the aforementioned employees operating such train may be permitted to proceed to such terminal or destination, but in such case shall not be required to do any switching or other work which would in any manner retard them in speedily reaching such terminal or destination: *Provided further*, That this act shall not apply in case of casualty upon such railroad, directly affecting such employee, nor shall it apply to sleeping car companies.

SEC. 2. It shall hereafter be unlawful for any corporation or receiver operating any line of railroad in whole or in part in this State, or any officer, agent, or representative of such corporation or receiver to require or knowingly permit any conductor, engineer, fireman, brakeman, train dispatcher or telegraph operator, who has been on duty for fourteen consecutive hours and who has gone off duty, to again go on duty or perform any work for such corporation or receiver until he has had at least eight hours off duty.

SEC. 3. Any corporation or receiver operating a line of railroad in whole or in part within this State, who shall violate any of the provisions of this act shall be liable to the State of Texas in a penalty of not less than two hundred dollars nor more than one thousand dollars for each offense, and such penalties shall be recovered and suit therefor shall be brought in the name of the State of Texas in any court having jurisdiction of the amount in Travis County, Texas, or in any county into or through which said railroad may pass. Such suit or suits may be brought either by the attorney-general or under his direction or by the county attorney or district attorney of any county or judicial district into or through which said railroad may pass, and such attorney bringing any action under this act shall be entitled to a compensation of one-third of the total amount of penalties recovered.

SEC. 4. Any officer, agent or representative of any corporation or receiver operating any line of railroad in whole or in part within this State, who shall violate any of the provisions of this act shall be deemed guilty of a misdemeanor, and upon conviction therefor shall be punished by a fine of not less than one hundred dollars, nor more than five hundred dollars for each offense, or by confinement in the county jail for not less than ten or more than sixty days, or by both such fine and imprisonment, and such person so offending may be prosecuted under this section, either in the county where such person may be at the time of the commission of the offense, or in any county where such employee has been permitted or required to work in violation of this act.

Approved April 1, 1907.

CHAPTER 67.—*Blacklisting.*

SECTION 1. Either or any of the following acts shall constitute a discrimination against persons seeking employment:

(1) Where any corporation or receiver of same, doing business in this State, or any agent or officer of any such corporation or receiver, shall blacklist, prevent, or attempt to prevent, by word, writing, sign[,] list or other means, directly or indirectly, any discharged employee, or any employee who may have voluntarily left said corporation's service, from obtaining employment with any other person, company or corporation, except by truthfully stating in writing on request of such former employee, the reason why such employee was discharged, or his relationship to such company ceased.

(2) Where any corporation or receiver of same, doing business in this State, or any officer or agent of such corporation or receiver, shall by any means, directly or indirectly communicate to any other person or corporation any information in regard to a person who may seek employment of such person or corporation, and fails to give such person, in regard to whom the communication may be made, within ten days after demand therefor, a complete copy of such communication, if in writing, and a true statement of such communication

if by sign, or other means, and the names and addresses of all persons or corporations to whom said communications shall have been made.

(3) Where any corporation or receiver of same, doing business in this State, or any agent or employee of such corporation or receiver, shall have discharged an employee, and such discharged employee demands a statement in writing, of the cause of his discharge, and such corporation, receiver, agent or employee thereof fails to furnish a true statement of same to such employee within ten days after such demand: *Provided*, That such demand by the employee for said statement shall be made in writing.

(4) Where any corporation or receiver of same, doing business in this State, or any agent or officer of same, shall have received any request, notice or communication, either in writing or by sign, word, list or otherwise, from any person, company or corporation, preventing or attempting or calculated to prevent the employment of a person seeking employment, and shall fail to furnish to such person seeking employment within ten days after a demand in writing therefor, a true statement of such request, notice or communication, and if in writing, a copy of same, and if a sign, the interpretation thereof, and the names and addresses of the person, company or corporation furnishing the same.

(5) Where any corporation or receiver of same, doing business in this State, or any officer or agent of such corporation or receiver discharging such employee shall have failed to give a discharged employee a true statement of the causes of his discharge within ten days after a demand in writing therefor, and shall thereafter furnish any other person or corporation any statement or communication in regard to such discharge, unless at the request of such discharged employee.

(6) Where any corporation or receiver of same, doing business in this State, or any officer or agent of such corporation or receiver shall discriminate against any person seeking employment on account of his having participated in a strike against another corporation.

(7) Where any corporation or receiver of same doing business in this State, or any officer or agent of such corporation or receiver, shall give any information or communication in regard to a person seeking employment having participated in any strike, unless such person seeking employment violated the law during his participation in said strike or in connection therewith, and unless such information is given in compliance with subdivision 1 of section 1 of this act.

SEC. 2. Any and all discriminations against persons seeking employment as herein defined, are hereby prohibited and are declared to be illegal.

SEC. 3. Every foreign corporation violating any of the provisions of this act is hereby denied the right, and is prohibited from doing any business within this State, and it shall be the duty of the attorney-general to enforce this provision by injunction or other proceeding in the district court of Travis County in the name of the State of Texas.

SEC. 4. Each and every person, company or corporation, who shall in any manner violate any of the provisions of this act shall for each and every offense committed forfeit and pay the sum of one thousand ($1,000) dollars, which may be recovered in the name of the State of Texas, in any county where the offense was committed, or where the offender resides, or in Travis County, and it shall be the duty of the attorney-general or the district or county attorney under the direction of the attorney-general to prosecute for the recovery of the same, and the fees of the prosecuting attorney for representing the State in proceedings under this act shall be over and above the fees allowed him under the general fee bill.

SEC. 5. In addition to the penalties and forfeiture herein provided for, every person violating any of the provisions of this act shall be guilty of a misdemeanor, and upon conviction shall be punished by imprisonment in the county jail for not less than one month nor more than one year.

SEC. 6. In prosecution for the violation of any of the provisions of this act, evidence that any person has acted as the agent of a corporation in the transaction of its business in this State shall be received as prima facie proof that his act in the name, behalf or interest of the corporation of which he was acting as the agent, was the act of the corporation.

SEC. 7. Upon the application of the attorney-general or of any district or county attorney made to any justice of the peace in this State, and stating that he has reason to believe that a witness, who is to be found in the county of which such justice of the peace is an officer, knows of a violation of any of the provisions of this act, it shall be the duty of the justice of the peace to whom

such application is made, to have summoned and to have examined such witness in relation to violations of any of the provisions of this act, said witness to be summoned as provided for in criminal cases. The said witness shall be duly sworn, and the justice of the peace shall cause the statements of the witness to be reduced to writing and signed and sworn to before him, and such sworn statement shall be delivered to the attorney-general, district or county attorney upon whose application the witness was summoned. Should the witness summoned as aforesaid fail to appear or to make statements of the facts within his knowledge under oath, or to sign the same after it has been reduced to writing, he shall be guilty of contempt of court and may be fined not exceeding one hundred dollars, and may be attached and imprisoned in the county jail until he shall make a full statement of all the facts within his knowledge with reference to the matter inquired about. Any person so summoned and examined shall not be liable to prosecution for any violation of the provisions of this act about which he may testify fully and without reserve.

SEC. 8. Said written cause of discharge, if true, when so made by such agent, company or corporation, shall never be used as the cause for an action for libel, either civil or criminal, against the agent, company or corporation so furnishing same.

Approved April 5, 1907.

CHAPTER 122.—*Hours of labor of telegraph operators, etc., on railroads.*

SECTION 1. It shall be unlawful for any person, corporation or association operating a railroad within this State to permit any telegraph or telephone operator who spaces trains by the use of the telegraph or telephone under what is known and termed "block system" defined as follows: Reporting trains to another office or offices, or to a train dispatcher operating one or more trains under signals, and telegraph or telephone levermen who manipulate interlocking machines in railroad yards or on main tracks out on the lines connecting side tracks or switches, or train dispatchers in its service whose duties substantially, as hereinbefore set forth, pertain to the movement of cars, engines or trains on its railroad by the use of the telegraph or telephone in dispatching or reporting or receiving or transmitting train orders as interpreted in this section, to be on duty for more than eight hours in any twenty-four consecutive hours: *Provided*, That the provisions of this act shall not apply to railroad, telegraph or telephone operators at stations where the services of only one operator is needed.

SEC. 2. Any person, corporation or association that shall violate section 1 of this act shall pay a fine of one hundred dollars for each violation of this act.

SEC. 3. It shall be unlawful for any railroad, telegraph or telephone operator to work more than eight hours in twenty-four consecutive hours at such occupation, and any such operator violating this section shall pay a fine in any sum not less than twenty-five dollars nor more than one hundred dollars: *Provided*, That in case of an emergency any operator may remain on duty for an additional two hours.

Approved April 16, 1907.

CHAPTER 129.—*Actions for personal injuries—Notice.*

SECTION 1. * * * no stipulation in any contract between a person, corporation or receiver operating railroad or street railway or interurban railroad and an employee or servant requiring notice of a claim by an employee or servant for damages for injury received to the person, or by a husband, wife, father, mother, child or children of a deceased employee for his or her death, caused by negligence as a condition precedent to liability, shall ever be valid. * * *

Approved April 18, 1907.

CHAPTER 138.—*Employment of women and minors in saloons.*

SECTION 19. Every retail liquor dealer or malt liquor dealer, * * * who shall have in his employ about his place of business, * * * any minor * * * shall be guilty of a misdemeanor, and upon conviction therefor shall be punished by a fine of not less than ten dollars nor more than two hundred dollars, or by imprisonment in the county jail for not longer than sixty days, or by both such fine and imprisonment.

SEC. 25. No retail liquor dealer or retail malt dealer shall employ or suffer to be employed, any female as a servant, bartender or waitress, other than a member of his own family, in his place of business, * * * and any person violating the provisions of this section shall be deemed guilty of a misdemeanor and upon conviction shall be punished by imprisonment in the county jail for not more than twelve months or by a fine of not exceeding five hundred dollars, or both such fine and imprisonment.

Approved April 18, 1907.

CHAPTER 141.—*Examination, etc., of barbers.*

SECTION 1. It shall be unlawful for any person to follow the occupation of barber in this State unless he shall first have obtained a certificate of registration as provided for in this act: *Provided, however*, That nothing contained in this act shall apply to or affect any person who is now actually engaged in such occupation, except as hereinafter provided.

SEC. 2. A board of examiners to consist of three persons is hereby created to carry out and enforce the provisions of this act. Said board shall be appointed by the governor and shall consist of practical barbers who have been for at least five years prior to their appointment engaged in the occupation of barber in this State. Each member of said board shall serve a term of two years and until his successor is appointed and qualified, and shall take the oath provided for public officers. Vacancies shall be filled by the governor for the unexpired portion of this term.

SEC. 3. Said board shall elect a president, secretary and treasurer, shall have a common seal and shall have the power to administer oaths. The office of secretary and treasurer may be filled by the same person, in the discretion of the board of examiners. The secretary and treasurer shall each give a bond with two or more good and sufficient sureties, payable to and to be approved by the secretary of state in the sum of one thousand ($1,000) dollars, conditions [conditioned] that they will each of them faithfully perform the duties of their respective offices.

SEC. 4. Each member of said board shall receive a compensation of three ($3) dollars per day and actual expenses for actual service, and three (3) cents per mile for each mile actually traveled in attending the meetings of the board, which compensation shall be paid out of any moneys in the hands of the treasurer of said board: *Provided*, That said compensation and mileage shall in no event be paid out of the state treasury. Said board shall present annually to the governor, in the month of July, a detailed statement of the receipts and disbursements of the board during the preceding year.

SEC. 5. Said examining board shall hold practical examinations at least four times each year, said examinations to be held in cities in different parts of the State, distributed as evenly as possible, for the convenience of applicants, and such other examinations at such times and places as the examining board may from time to time determine. Whenever complaint is made to the board of examiners or to the state health officer that any barber shop within this State is kept in an unsanitary condition, or that a contagious disease has been imparted to any customer of such shop, a member of the board of examiners shall visit and inspect such shop, and if he finds such shop to be in an unsanitary condition, or finds that a contagious disease has been imparted to a customer of such shop, he shall proceed as provided in section 12 of this act.

SEC. 6. Every person now engaged as a barber in this State, shall within ninety (90) days after the approval of this act, file with the secretary of the board of examiners an affidavit setting forth his name, residence and length of time during which, and the place in which he has practiced such occupation, and shall pay to the treasurer of said board two ($2) dollars, and a certificate of registration entitling him to practice said occupation in this State shall be issued to him subject to the provisions of this act.

SEC. 7. Any person not engaged as barber at the time of the passage of this act desiring to obtain a certificate of registration under this act shall make application to the board of examiners, therefor, pay to the treasurer of said board an examination fee of two ($2) dollars, presenting himself at the next regular meeting of the board for the examination of applicants, and if he shows that he has studied the trade for two years as an apprentice under one or more practicing barbers, or practiced the trade for at least two years in this State or some other State in the United States, and he is possessed of the requisite skill in such trade to properly perform all the duties thereof, including his ability in

preparation of the tools, shaving, hair cutting and all the duties and services incident thereto, and of sufficient knowledge concerning the common diseases of the face and skin to avoid the aggravation and spreading thereof in the practice of said trade, his name shall be entered by the board on the register hereafter provided for and a certificate of registration shall be issued to him authorizing him to practice said trade in this State subject to the provisions of this act.

SEC. 8. Nothing in this act shall prohibit any person from serving as a barber apprentice under a barber authorized to practice his trade under this act: *Provided*, That any person desiring to so work as an apprentice, must apply to said board to have his name entered in a register kept by the board for such purpose, giving the date of his apprenticeship, and after serving two (2) years in the trade, he will then be eligible to become a registered barber, by complying with the provisions of section 7 of this act: *Provided*, That nothing in this act shall apply to the students of the State University or other schools of the State who are or may be making their way through school by serving as barber, or those serving as barber in any of the eleemosynary institutions of the State; nor shall the provisions of this section apply to persons serving as barber in towns of 1,000 inhabitants or less.

SEC. 9. Said examining board shall furnish to each person to whom a certificate of registration is issued, a card or insignia bearing the seal of the board and the signature of its president and secretary, certifying that the holder thereof is entitled to practice the occupation of barber in this State, and it shall be the duty of the holder of such card or insignia to post the same in a conspicuous place in front of his working chair where it may be seen by all persons whom he may serve.

SEC. 10. The examining board shall keep a record of all its proceedings; shall also show what action was had on all applications, whether the applicant was registered or rejected by examination or otherwise, and such books shall be prima facie evidence of all matters required to be kept therein. The examining board shall have power to adopt rules and regulations prescribing the sanitary requirements of barber shops; subject to the approval of the state health officer, and shall have said rules and regulations printed and transmit a copy to each proprietor of a barber shop in the State. The failure of the proprietor of any barber shop in the State to comply with said sanitary rules and regulations shall be sufficient cause for the revocation of his certificate of registration; subject to the provisions of section 12 of this act.

SEC. 11. Said board shall keep a register in which shall be entered the names of all persons to whom certificates are issued under this act, and said register shall at all times be open to public inspection.

SEC. 12. If any shop be found in an unsanitary condition, or if the holder of any certificate be charged with imparting any infectious disease, the board of examiners shall immediately notify the local health officer thereof, and such shop may be quarantined and the barber so charged shall not practice his occupation until such quarantine shall be removed by the health officer.

SEC. 13. To shave or trim the beard or cut the hair of any person for hire or pay to the person performing such service or any other person, shall be construed as practicing the occupation of barber within the meaning of this act.

SEC. 14. Any person practicing the occupation of barber in this State, without having obtained a certificate of registration, as provided for in this act, or employing a barber who has not such a certificate, or falsely pretending to be qualified to practice such occupation under this act, or violation of any of the provisions of this act, shall be guilty of a misdemeanor, and upon conviction thereof, shall be punished by a fine not less than ten ($10) dollars nor more than twenty-five ($25) dollars.

Approved April 18, 1907.

CHAPTER 178.—*Mine regulations.*

SECTION 1. (a) Any shaft in process of sinking and any opening projected for the purpose of mining coal of all kinds shall be subjected to the provisions of this act.

(b) At the bottom of every shaft and every caging place therein a safe commodious passageway must be cut around said landing place, to serve as a traveling way by which employees shall pass from one side of the shaft to the other without passing under or on the cage.

(c) The upper and lower landings at the top of each shaft, and the openings of each intermediate seam from or to the shaft shall be clear and free from loose materials and shall be securely fenced with automatic or other gates or bars so as to prevent either men or materials from falling into the shaft.

(d) Every hoisting shaft must be equipped with substantial cages fitted to guide rails running from the top to the bottom. Said cages must be safely constructed, they must be furnished with suitable boiler iron covers to protect persons riding thereon from falling objects, and they must be equipped with safety catches. Every cage on which people are carried must be fitted with iron bars, rings, or chains in proper place and in sufficient number to furnish a secure handhold for every person permitted to ride thereon. At the top landing, cage supports, where necessary, must be carefully set and adjusted so as to work properly and securely hold the cages when at rest.

In all cases where the human voice can not be distinctly heard there shall be provided a metal tube or telephone from the top to the bottom of the shaft or slope through which conversation may be held between persons at the bottom and top of such shaft or slope, and that there shall also be maintained an efficient system of signaling to and from the top of the shaft or slope and each seam or opening.

Every underground place on which persons travel, worked by self-acting engines, windlasses or machinery of any description shall be provided with practical means of signaling between the stopping places and the ends of the plane, and shall further be provided, at intervals of not more than sixty feet, with sufficient manholes for places of refuge.

Every mine shall be supplied with props and timbers of suitable length and size, and if from any cause the timbers are not supplied when required, the miners shall vacate any and all such working places until supplied with timber needed.

All openings worked out or abandoned portions of every operated mine likely to accumulate explosive gases or dangerous conditions shall be securely gobbed and blocked off from the operated portions thereof so as to protect every person working in such mines from all danger that may be caused or produced by such worked out portions of such mines.

SEC. 2. (a) Throughout every mine there shall be maintained currents of fresh air sufficient for the health and safety of all men and animals employed therein, and such ventilation shall be produced by a fan or some other artificial means: *Provided*, A furnace shall not be used for ventilating any mine in which explosive gases are generated.

(b) The quantity of air required to be kept in circulation and passing a given point shall be not less than one hundred cubic feet per minute for each person and not less than three hundred cubic feet per minute for each animal in the mine, measured at the foot of the downcast, and this quantity may be increased at the discretion of the inspector whenever in his judgment unusual conditions make a stronger current necessary. Said current shall be forced into every working place throughout the mine so that all parts of the same shall be reasonably free from standing powder smoke and deleterious air of any kind.

(c) The measurement of the current of air shall be taken with an anemometer at the foot of the downcast, at the foot of the upcast and at the working face of each division or split of the air current.

(d) The main current of air shall be split or subdivided [so] as to provide a separate current of reasonably pure air to every one hundred men at work, and the inspector shall have authority to order separate currents for smaller groups of men if in his judgment special conditions make it necessary.

(e) The air current for ventilating the stable shall not pass into the intake air current for ventilating the working parts of the mine.

(f) Whenever the inspector shall find men working without sufficient air he shall at once give the mine manager or operator notice and a reasonable time in which to restore the current, and upon his or their refusal or neglect to act promptly the inspector may order the endangered men out of the mine.

SEC. 3. Immediate notice must be conveyed by the miner or mine owner to the inspector upon the appearance of any large body of fire damp in any mine, whether accompanied by any explosion or not, and upon the concurrence [occurrence] of any serious fire within the mine or on the surface.

SEC. 4. Cages on which men are riding shall not be lifted or lowered at a rate greater than six hundred feet per minute, except with the written consent of the inspector. No person shall carry any tools or material with him on a cage in motion, except for use in making repairs, and no one shall ride on a cage while

the other cage contains a loaded car. No cage having an unstable or self-dumping platform shall be used for the carriage of men or materials unless the same is provided with some convenient device by which said platform can be securely locked, and unless it is so locked whenever men or material are being conveyed thereon.

SEC. 5. No miner or other person shall carry powder into the mine except in the original keg or in a regulation powder can securely fastened, and the can in otherwise air-tight condition.

SEC. 6. It shall be the duty of the mine foreman to see that proper cut throughs are made in all the pillars at such distances as in the judgment of the mine inspector may be deemed requisite, not more than twenty yards nor less than ten yards apart, for the purpose of ventilation and the ventilation shall be conducted through said cut throughs into the rooms and entries by means of check doors made of canvas or other material, placed on the entries or in other suitable places, and he shall not permit any room to be opened in advance of the ventilating current. Should the mine inspector discover any room, air way or other working place being driven in advance of the air current contrary to the requirements of this section he shall order the workmen in such places to cease at once until the law is complied with.

SEC. 7. At any mine where the inspector shall find fire damp is being generated so as to require the use of a safety lamp in any part thereof, the operator of such mine upon receiving notice from the inspector that one or more such lamps are necessary for the safety of the men in the mines, shall at once procure and keep for use such number of safety lamps as may be necessary.

SEC. 8. It shall be unlawful for any miner, workman or other person knowingly or carelessly to injure any shaft, safety lamp, instrument, air course or brattice, or to obstruct or throw open an air way, or to carry any open lamp or lighted pipe or fire in any form into a place worked by the light of safety lamps or within three feet of any open powder, or to handle or disturb any part of the hoisting machinery, or to enter any part of the mine against caution, or to do any willful act whereby the lives or health of persons working in mines or the security of the mine machinery thereof is endangered.

SEC. 9. It shall be the duty of every operator to post on the engine house and at the pit top of his mine, in such manner that the employees of the mine can read them, rules not inconsistent with this act, plainly printed in the English language, which shall govern all persons working in the mine. And the posting of such notice, as provided, shall charge all employees of such mine with legal notice of the contents thereof.

SEC. 10. The owner or operator of every mine shall provide adequate and accurate scales for weighing coal, and it shall be the duty of the mine inspector to examine such scales and if same are not found to be accurate he shall notify the owner to repair same, and if such owner fails or refuses to repair same within a reasonable time said inspector shall institute proceedings under the law against the proper parties.

SEC. 11. The employees in any mine in this State shall have the right to employ a check weighman at their own option and their own expense.

SEC. 12. No miner or other person employed in a mine shall use any kind of oil other than a good quality of lard oil for lighting purposes, except when repairing downcast or upcast shafts.

SEC. 13. Any person who shall willfully violate any of the provisions of this act shall be deemed guilty of a misdemeanor, and upon conviction shall be punished by a fine not exceeding five hundred dollars, or imprisonment in the county jail for a period not exceeding six months.

SEC. 14. For the purpose of securing efficiency in the mine inspection service a board of examiners, to be known as the state mining board, whose duty it shall be to make formal inquiry into and pass upon the practical and technical qualifications and personal fitness of persons seeking appointments as state inspector of mines, shall be appointed by the governor.

SEC. 15. Said board shall be composed of seven members, three of whom shall be practical miners, three shall be mine operators, and it shall be the first duty of the six members thus appointed to nominate to the governor the seventh member of said board: *Provided*, That if the six members aforesaid shall fail for a period of ten days after their appointment to so nominate the seventh member, the same shall be appointed by the governor. Such board shall be appointed by the governor within ninety days after the passage of this act. Said board shall hold office for a period of two years and until their successors have been appointed and qualified.

SEC. 16. The board shall meet in the capitol building at Austin, within thirty days after its appointment and biennially thereafter, for the purpose of hearing applications for the office of state mining inspector. It shall be the duty of the board to thoroughly examine all applicants who may come before it, and to select from among such applicants the person who in its opinion is best qualified to perform the duties of state mining inspector, and upon the nomination of said board the governor shall appoint the person so recommended.

SEC. 17. The state mine inspector shall be a citizen of the United States, and shall have resided in the State of Texas for one year, of temperate habits, of good repute, a man of personal integrity, shall have attained the age of thirty years, and shall have had at least five years experience working in and around coal mines, and shall not have any pecuniary interest whatever in any mine in this State. He shall hold office for a period of two years unless sooner removed as provided herein.

SEC. 18. It shall be the duty of the state mining board to exercise supervision over the acts of the state mine inspector, and in the event of his incompetency or the neglect of his duty being proved to the board, said board shall recommend to the governor that he be removed from office and his successor shall be chosen as herein provided.

SEC. 19. The state mining board shall meet twice each year and at such time and place as the majority may select for the purpose of receiving reports from the inspector and instructing him in the performance of his duty.

SEC. 20. The members of the state mining board shall receive as compensation for their services the sum of five dollars per day for a period not exceeding thirty days in any one year and traveling expenses in going to and returning from board meetings.

SEC. 21. It shall be the duty of the state mine inspector to enforce the provisions of this act under the instruction of the state mining board, and to make report to said board at its semiannual meetings and oftener if required. He shall receive for his services the sum of fifteen hundred dollars per year, and actual traveling expenses incurred in the discharge of his duty: *Provided*, That his traveling expenses shall not in any one year exceed the sum of $500.

Approved April 30, 1907.

UTAH.

ACTS OF 1907.

CHAPTER 33.—*Mine regulations—Care of injured persons.*

SECTION 1. At all mines in the State of Utah where ten or more men are employed, it shall be the duty of the operator or owners thereof to keep readily accessible a properly constructed stretcher, a woolen blanket, a waterproof blanket and a supply of linseed oil, antiseptic gauze, carbolated vaseline, sponges, soap, liniment, carbolic acid, rubber bandages, suitable towels and wash basins, all for the comfort and treatment of anyone injured in such mine.

SEC. 2. Any willful neglect, refusal or failure to do the things required to be done by the preceding section, or any attempt to obstruct or interfere with the complying with the provisions of this act, shall be deemed a misdemeanor punishable by a fine in any sum less than three hundred dollars, or, by imprisonment in the county jail not to exceed six months, or by both such fine and imprisonment.

Approved this 11th day of March, 1907.

CHAPTER 76.—*Interference with employment.*

SECTION 1. It shall be unlawful for any person, persons, association of persons, combination of persons, or body of persons to interfere with the rights of any individual engaged in labor, to exercise his full privileges under the Constitution of this State or of the United States, as to where he shall be employed, by whom he shall be employed and at what compensation he shall be employed.

SEC. 2. Anyone violating the provisions of this act shall be guilty of a misdemeanor.

Approved this 14th day of March, 1907.

CHAPTER 131.—*Bureau of statistics.*

SECTION 1. Section 1, chapter 55 Laws of Utah 1901 is hereby amended to read as follows:

Section 1. A state bureau of statistics is hereby created and established and the said bureau shall be under the control of the state auditor. The state auditor shall be ex officio the commissioner of said state bureau of statistics.

SEC. 3. The state auditor who by this act is made ex officio the commissioner of the state bureau of statistics shall appoint a chief clerk or deputy commissioner who shall receive such compensation as [is] provided by law.

Approved this 23d day of March, 1907.

CHAPTER 154.—*Examination, etc., of barbers.*

SECTION 1. Sections 1, 5, 6, 9, 10, 11, 13 and 14 of chapter 137, Laws of Utah, 1903, are hereby amended to read as follows:

Section 1. It shall be unlawful for any person to follow the occupation of a barber, barber's apprentice or to conduct a barber shop, barber school or barber college in this State unless he shall have first obtained a certificate of registration as provided in this act. A person so engaged less than six months shall be considered an apprentice and at the expiration of six months of such employment shall be subject to the provisions of this act as hereinafter provided. No person practicing the occupation of a barber in any barber school or college in this State shall serve a person afflicted with erysipelas, eczema, impetigo, sycosis, tuberculosis, or any other contagious or infectious disease. Any person so afflicted is hereby prohibited from being barbered in any barber shop, barber school or college in this State.

Any violation of this section will be considered a misdemeanor as provided for in this act.

Sec. 5. Such board shall have power to adopt reasonable rules and regulations prescribing the sanitary requirements of a barber shop, barber school or college, subject to the approval of the state board of health and to cause the rules and regulations so approved to be printed in a suitable form and to transmit a copy thereof to the proprietor of each barber shop, barber school or college in this State.

It shall be the duty of every proprietor or person operating a barber shop, barber school or college in this State to keep posted in a conspicuous place in his shop, school or college, so as to be easily read by his customers a copy of such rules and regulations. A failure of any such proprietor or manager to keep such rules so posted, or to observe the requirements thereof, shall be sufficient grounds for the revocation of his license, but no license shall be revoked without a reasonable opportunity being offered to such proprietor or manager to be heard in his defense. Any member of said board shall have power to enter and make examination of any barber shop, barber school or college in this State during business hours for the purpose of ascertaining the sanitary condition thereof. Any barber shop, barber school or college in this State in which tools, appliances and furnishings in use therein are kept in an unclean or insanitary condition so as to endanger health, is hereby declared to be a public nuisance and the proprietor thereof shall be subject to prosecution and punishment therefor. Each member of said board shall have power to administer oaths, and the board may at its discretion appoint deputies who shall exercise the powers herein granted to said board, said deputies to serve without pay.

Sec. 6. Each member of said board shall receive a compensation of four dollars per day for actual service, and ten cents for each mile actually traveled in attending the duties of the board, which compensation shall be paid out of any moneys in the hands of the treasurer of said board, after an allowance thereof by the board upon an itemized and verified claim thereof being filed with the secretary by the member claiming the same, but in no event shall any part of the expense of the board or any member thereof be paid out of the state treasury.

Sec. 9. Every person now engaged in the occupation of a barber in this State shall, within 90 days after the approval of this act, file with the secretary of said board an affidavit setting forth his name, residence and the length of time during which, and the place where he has practiced such occupation, and shall pay to the treasurer of said board one dollar, and a certificate of registration entitling him to practice said occupation thereupon shall be issued to him.

Sec. 10. Any person other than those mentioned in section 9 desiring to obtain a certificate of registration under this act shall make application to said board therefor, and shall pay to the treasurer of said board an examination fee of $5.00, and shall present himself at the next regular meeting of the board for the examination of applicants, whereupon said board shall proceed to examine said person, and being satisfied that he is above the age of 16 years, of good moral character, free from contagious or infectious diseases; that he had either studied the occupation for six months as an apprentice under a qualified practicing barber, or that he has studied the occupation in a barber school or college as defined by this act, for six months or has practiced the occupation for at least six months and is possessed of a requisite skill in said occupation to properly perform all the duties thereof, including his ability in the preparation of tools, shaving, hair cutting and a thorough knowledge of the sanitary requirements of a barber shop, barber school or college, and all the duties and services incident thereto, his name shall then be entered by the board in the register hereinafter provided for, and a certificate of registration shall be issued to him authorizing him to practice said occupation in this State: *Provided*, That whenever it appears that the applicant has insufficient knowledge of the sanitary requirements of a barber shop, school or college to prevent the spread of disease, the board may withhold from him a qualified barber certificate if it shall appear that he is not qualified to practice the said occupation.

Sec. 11. A barber school or college is hereby declared to be a school or college conducted by suitable persons who are authorized to practice the occupation of a barber in this State, and in which all instruction is given by competent persons so authorized and in which the course and period of training shall comply with the rules and regulations of said board specifically adopted for the government of barber schools or colleges.

Sec. 13. Every apprentice, in order to avail himself of the provisions of this act, must file with the secretary of the board a statement in writing showing the name and place of business of his employer, the date of commencement of employment with him, and the full name and age of said apprentice, and shall pay to the treasurer of said board a fee of one dollar.

Sec. 14. Said board shall furnish to each person to whom a certificate of registration is issued and to each registered apprentice a card or insignia bearing the seal of the board and the signature of its president and secretary, certifying that the holder thereof is entitled to practice the occupation of a barber's apprentice in this State, and it shall be the duty of the holder of such card or insignia to post the same in a conspicuous place in front of his working chair, where it may readily be seen by all persons whom he may serve. Said card or insignia shall be renewed on or before the first day of July of each year and the holder of said certificate of registration or apprentice card shall pay to the secretary of said board the sum of one dollar for such renewal card or insignia. Upon the failure of any holder of a certificate of registration or apprentice card to apply for a renewal of his card or insignia on or before the first day of July in each year, his said certificate or apprentice card may be revoked by said board, subject to the provisions of section 16 of this act.

Approved this 25th day of March, 1907.

WASHINGTON.

ACTS OF 1907.

CHAPTER 20.—*Hours of labor of employees on railroads.*

SECTION 1. It shall be unlawful for any common carrier by railroad or any of its officers or agents, to require or permit any employee engaged in or connected with the movement of any train to remain on duty more than sixteen consecutive hours, except when by casualty occurring after such employee has started on his trip; or, except by accident or unavoidable delay of trains scheduled to make connection with the train on which such employee is serving, he is prevented from reaching his terminal; or, to require or permit any such employee who has been on duty sixteen consecutive hours to go on duty without having had at least ten hours off duty; or, to require or permit any such employee who has been on duty sixteen hours in the aggregate in any twenty-four

hour period to continue on duty without having had at least eight hours off duty within the twenty-four hour period.

SEC. 2. That any such common carrier, or any of its officers or agents violating any of the provisions of this act is hereby declared to be guilty of a misdemeanor, and upon conviction thereof shall be liable to a penalty of not less than one hundred or more than one thousand dollars for each and every such violation to be recovered in a suit or suits to be brought by the attorney-general; and it shall be the duty of the attorney-general to bring such suits upon duly verified information being lodged with him of such violation having occurred, in any superior court; and it shall also be the duty of the railroad commission to fully investigate all cases of the violation of this act, and to lodge with the attorney-general information of any such violation as may come to its knowledge.

Approved by the governor February 18, 1907.

CHAPTER 128.—*Employment of children—Age limit.*

[See Bulletin No. 73, p. 806.]

CHAPTER 138.—*Railroads—Blocking frogs, etc.*

SECTION 1. Section 1 of an act * * * approved March 6th, 1899, is hereby amended to read as follows:

Section 1. Any person or persons, railroad companies or corporations, owning or operating a railroad or railroads in this State, shall be and are hereby required on or before the first day of October, 1899, to so adjust, fill, block and securely guard the frogs, switches and guard rails on their roads as to protect and prevent the feet of employees and other persons from being caught therein. Any railroad operating within this State, shall not employ or use as flagman any person or persons who can not read, write and speak the English language.

Approved by the governor March 12th, 1907.

CHAPTER 175.—*Saw guards in shingle mills.*

SECTION 1. An act entitled "An act for the purpose of protecting knot sawyers in shingle mills, and requiring owners and operators of shingle mills to protect knot saws with metallic saw guards, imposing penalties for failure to do so, and declaring the law of negligence in cases where any person is injured by any knot saw not protected by metallic saw guard," approved March 1st, 1895, is hereby repealed.

Approved by the governor March 15, 1907.

CHAPTER 200.—*Inspection of steam vessels.*

SECTION 1. The commissioner of labor shall be charged with the administration of the provisions of this act, shall employ the necessary inspectors to enable him to carry said provisions into effect, and shall exercise supervision over them in the performance of their duties.

SEC. 2. The commissioner of labor shall annually, or oftener if he has good cause to believe it reasonable, inspect, or cause to be inspected, every steam vessel or other vessel operated by machinery engaged in carrying passengers for hire or towing for hire, excepting vessels which are subject to inspection under the laws of the United States, examine carefully her hull, boats and other equipment, examine her engine and boilers, ascertain how long it will be safe to use the same, determine the pressure of steam to be allowed and so regulate the fusible plugs, safety valves and steam cocks as to insure safety, and he may require such changes, repairs and improvements to be adopted and used as he may deem expedient for the contemplated route. He shall also fix the number of passengers that may be transported. He shall also, whenever he deems it expedient, visit any vessel licensed under this act and examine into her condition for the purpose of ascertaining whether or not any party thereon having a certificate from him has conformed to and obeyed the conditions of such certificate and the provisions of this act. The owner, master, pilot, captain or engineer of such vessel shall answer all reasonable questions, and shall give all the information in his or their power, in regard to said vessel, her machinery and the manner of managing the same. In case of damage by fire or by explo-

sion or by means of an electrical apparatus, he may investigate the cause thereof, and if found by him to have been occasioned by a violation of any of the provisions of this act, or of the orders, regulations and requirements issued by him, he shall so certify to the prosecuting attorney of the county where such violation occurred, together with the names of the persons guilty thereof and of the witnesses.

SEC. 3. The commissioner shall also test the boilers of all steam vessels, before the same shall be used, and at least once in every year thereafter. In subjecting to the hydrostatic test, boilers called and usually known under the designation of high pressure boilers, the hydrostatic pressure applied must be in proportion of one hundred and fifty pounds to the square inch to one hundred pounds to the square inch of the steam pressure allowed. And in subjecting to the hydrostatic test, that class of boilers usually designated and known as low pressure boilers, the commissioner shall allow as the working power of each new boiler, a pressure of only three-fourths the number of pounds to the square inch, to which it shall have been subjected by the hydrostatic test, and found to be sufficient therefor; but should said commissioner be of the opinion that such boiler, by reason of its construction or material will not safely allow so high a working pressure he may, for reasons specifically stated in his certificate, fix the working pressure of such boiler at less than three-fourths of said test pressure; and no boiler or pipe, or any of the connections therewith, shall be approved, which is made in whole or in part, of bad material, or is unsafe in its form, or dangerous from defective workmanship, age, use or other cause. In addition to the hydrostatic test as herein provided, the commissioner may cause a hammer test to be made and an internal examination of such boiler or boilers so tested, whenever deemed necessary. Any boiler having been in use ten years or more may be drilled at the bottom of shell or boiler, and also at such other points as the inspectors may direct to determine the thickness of such material at those points, and the general condition of such boiler or boilers at the time of inspection and the steam pressure allowed shall be determined by such ascertained thickness and general condition of the boiler. He shall also see that all connections to the said boiler or engines are of suitable material, size and construction; and that the boiler, machinery and appurtenances are such as may be employed with safety in the service to be performed. He shall also satisfy himself that the safety valves are of suitable dimensions and that the weights of the same are properly adjusted, so as to allow no greater pressure than the maximum amount prescribed by him; and that there is a sufficient number of gauge cocks, properly attached to the boiler, so as to indicate the quantity of water therein; and suitable steam gauges to correctly show the amount of steam carried; and as to any other matter connected with such steam vessel or the machinery thereof, that to said commissioner shall seem necessary to the safety of her passengers and crew. And he shall make such inspection, examination and test of naphtha launches and electric launches and their apparatus and machinery, as will enable him to determine whether they can be safely used in navigation.

SEC. 4. The commissioner, if satisfied that such vessel is in all respects safe and conforms to the requirements of this act, shall make and subscribe duplicate certificates, setting forth the age of the vessel, the date of inspection, the name of the vessel, the name of the owner, the master, the number of licensed officers and crew which he deems necessary to manage the vessel with safety, the number of boats and life-preservers required, and the number of passengers that she can safely carry, and if a steam vessel, the age of the boiler, and the pressure of steam she is authorized to carry. One of such certificates shall be kept posted in some conspicuous place on the vessel to be designated by the commissioner in the certificate and the other copy shall be kept by the commissioner and by him recorded in a book to be kept for that purpose. If the commissioner refuses to grant a certificate of approval, he shall make a statement in writing, giving his reasons for such refusal, and deliver the same to the owner or master of the vessel.

SEC. 6. All steamboats and other vessels to which this act is applicable, shall hereafter be so constructed that the woodwork about the boilers, chimneys, fire boxes, cook houses, stove and steam pipes, or any machinery or apparatus involving danger of fire, where such woodwork is exposed to ignition, shall be so shielded by some incombustible material, that the air may circulate freely between such material and woodwork or other ignitible substances, and before granting a certificate of inspection, the commissioner shall require that all other

necessary provisions be made throughout such vessel, as he may judge expedient to guard against loss or damage by fire.

SEC. 13. Whoever intentionally loads or obstructs, or causes to be loaded or obstructed, in any way, the safety valve of the boiler, or employs any other means or device whereby the boiler may be subjected to a greater pressure than the amount allowed by the commissioner's certificate, or intentionally deranges or hinders the operation of any machinery or device employed to denote the stage of the water or steam in any boiler, or to give warning of any approaching danger, or intentionally permits the water to fall below the prescribed low water limit of the boiler, shall forfeit to the State of Washington the sum of five hundred dollars for each violation.

SEC. 14. Every person employed as master, pilot or engineer on board of a steam vessel or a vessel propelled by machinery, carrying passengers for hire or towing for hire, shall be examined by the commissioner as to his qualifications, and if satisfied therewith he shall grant him a license for the term of one year for such boat, boats or class of boats as said commissioner may specify in such license. In a proper case, the license may permit and specify that the master may act as pilot, and in case of small vessels also as engineer and pilot. The license shall be framed under glass, and posted in some conspicuous place on the vessel on which he may act. Whoever acts as master, pilot or engineer, without having first received such license, or upon a boat or class of boats not specified in his license, shall be liable to a penalty of fifty dollars for each day that he so acts, except as in this act otherwise specified, and such license may be revoked by the commissioner for intemperance, incompetency or willful violation of duty.

SEC. 20. No master, engineer or other person having charge of the boiler or apparatus for the generation of steam of any steamboat or vessel shall create, or allow to be created any undue or unsafe quantity of steam in order to increase the speed of such boat or to excel another boat in speed. Any person violating provisions of this section shall forfeit to the State of Washington the sum of five dollars for every such violation.

SEC. 21. Every master of a steamboat or vessel who shall violate any of the preceding sections of this act shall, for every such violation, forfeit to the State of Washington the sum of two hundred and fifty dollars, unless a different penalty is prescribed.

SEC. 23. The master of every vessel shall keep a copy of the preceding sections of this act posted in a conspicuous place on such vessel for the inspection of all persons on board thereof. Every master violating the provisions of this section shall forfeit to the State of Washington, twenty-five dollars, and the additional sum of twenty-five dollars for each month while such violation continues.

SEC. 24. The commissioner shall on or before the first day of January in each year, make a verified report to the governor, containing a detailed statement of the names and number of vessels examined and licensed, the names and number of vessels to which licenses were refused and stating the reasons for the refusal, the names and number of persons examined and licensed, the names and number to whom licenses were refused and stating the reasons therefor, and may include in such report any other information he may deem desirable.

SEC. 26. For each inspection provided for in sections two and three of this act the owner or master of each vessel shall pay the commissioner of labor an inspection fee, which shall not be less than five dollars, nor more than twenty dollars, to be fixed by the commissioner of labor with reference to the size of the vessel inspected. For each license issued under section eighteen of this act the person so licensed shall pay to the commissioner of labor the sum of five dollars. All of the fees received from this source shall be accounted for by the commissioner of labor to the state treasurer, and credited to the general fund.

SEC. 27. The inspectors provided for in this act shall receive seven dollars per diem for the time actually engaged in making the inspections and examinations provided for herein, and shall be paid necessary traveling expenses when making such inspections and conducting such examinations at other than the domicile of said inspectors.

SEC. 28. Any inspector duly employed by the commissioner of labor for the execution of any of the provisions of this act, shall be deemed to be a deputy of said commissioner for the purposes hereof, and may perform any act and exercise any authority herein prescribed for the commissioner of labor.

Approved by the governor March 15th, 1907.

CHAPTER 205.—*Inspection of factories, etc.*

[See Bulletin No. 73, pp. 969 to 972.]

CHAPTER 224.—*Railroad employees—Purchase of uniforms.*

SECTION 1. It shall be unlawful for any railroad or other transportation company doing business in the State of Washington, or of any officer, agent or servant of such railroad or other transportation company, to require any conductor, engineer, brakeman, fireman, purser, or other employee, as a condition of his continued employment, or otherwise to require or compel, or attempt to require or compel, any such employees to purchase of any such railroad or other transportation company or of any particular person, firm or corporation or at any particular place or places, any uniform or other clothing or apparel, required by any such railroad or other transportation company to be used by any such employee in the performance of his duties as such; and any such railroad or transportation company or any officer, agent or servant thereof, who shall order or require any conductor, engineer, brakeman, fireman, purser, or other person in its employ, to purchase any uniform or other clothing or apparel as aforesaid, shall be deemed to have required such purchase as a condition of such employee's continued employment.

SEC. 2. Any railroad or other transportation company doing business in the State of Washington, or any officer, agent or servant thereof, violating any of the provisions of this act shall be deemed guilty of a misdemeanor and upon conviction thereof shall be punished by a fine in any sum not less than one hundred dollars ($100) nor more than five hundred dollars ($500), or by imprisonment in the county jail of the county where the misdemeanor is committed, not exceeding six months.

Approved by the governor March 16th, 1907.

CHAPTER 226.—*Railroads—Accidents—Safety appliances.*

SECTION 10. There shall be added to said act [chapter 81, Acts of 1905] to be designated as section 28 the following:

Section 28. The [railroad] commission is hereby authorized and directed to investigate all accidents that may occur upon any railroad operating in this State resulting in loss of life to any passenger or employee. Said commission is hereby authorized to administer oaths and examine such witnesses as it may deem necessary and proper to thoroughly ascertain the cause and for the purpose of fixing the responsibility therefor. Such examination and investigation may be made by the commission or any one of the commissioners, or the same may be made by its inspector of tracks and equipment, and such inspector shall have the right to administer oaths and examine witnesses in case the investigation is made by him. The commission shall report to the governor from time to time the result of all such investigations.

SEC. 13. There shall be added to said act to be designated as section 31 the following:

Sec. 31. It shall be unlawful for any railroad or railway corporation or company owning and operating, or operating, or that may hereafter own or operate, a railroad in whole or in part in this State to knowingly or negligently use or operate any car, tender or locomotive, that is defective, or any car or locomotive upon which the machinery or attachments thereto belonging are in any manner defective, or to knowingly operate its train over any defective or dangerous track, bridge or structure.

SEC. 14. There shall be added to said act to be designated as section 32 the following:

Sec. 32. Every railroad corporation owning or operating a railroad or part of a railroad in this State shall on or before the first day of January, 1908, equip and furnish all cars owned or leased and used by it in its service in this State with automatic couplers, coupling automatically, which can be coupled and uncoupled without the necessity of men going between the ends of the cars, and shall equip, furnish and operate all cars in its passenger service, and not less than 80 per cent. of such cars in its freight service with perfectly acting air brakes, and also with good and sufficient hand brakes, and in such a manner as to enable the engineer under ordinary conditions to control the speed of the train without the use of hand brakes, and no freight train shall after such date be run by any such railroad corporation over any part of its road lying within this State, unless the cars composing such freight train are so furnished and

equipped. All freight cars shall be equipped and provided with proper grab irons, ladders and stirrups, securely bolted on so as to enable the employees to climb upon and off such cars with safety: *Provided, however*, That this section shall not apply to boarding and outfit cars when moved as work trains, or to trains consisting wholly of logging trucks and a passenger car or caboose, or to freight trains consisting of not to exceed fifty per cent. of logging trucks.

SEC. 15. There shall be added to said act to be designated as section 33 the following:

Sec. 33. An inspector of safety appliances and tracks, bridges and structures shall be appointed by the railroad commission of Washington, at a salary of not to exceed two thousand dollars per annum. Such inspector shall not be an officer of any railroad operating in this State, nor shall he be interested, directly or indirectly, in the stock or bonds of any railroad company, and he shall have had at least seven years actual experience in the operating department of some railroad. Before entering on his duties, the said inspector shall give a bond to the State of Washington in the sum of five thousand dollars secured by a bond and security company acceptable to the railroad commission conditioned for the faithful performance of his duties, and shall make and file an affidavit that he is not an officer or director of any railroad company, and is not directly or indirectly interested in the stock or bonds of any railroad company, and such other facts as are required of employees of the State.

SEC. 16. There shall be added to said act to be designated as section 34 the following:

Sec. 34. It shall be the duty of the inspector to inspect the couplers, air brakes and automatic power brakes found on the cars and engines, and the grab irons, ladders, stirrups and hand brakes on all freight cars of any railroad in Washington, and make such report of his inspection to the railroad commission as it may order and require, reporting all cars, tenders and engines, giving the number of the same, the road on which they are found and the road owning same if known which is found to have a defective coupler, brake or other defect rendering the operation thereof in any way dangerous, particularly describing such defects. He shall on discovering a defective coupler, brake or other defect rendering the use of such car, tender or engine dangerous immediately report the same to the superintendent of the road on which it is found and to the agent thereof at the nearest station, describing the defect. Such inspector may, on the discovery of the defective coupler, brake or other defect rendering the use of such car, tender or engine dangerous condemn such car, tender or engine, and order the same out of service until repaired and put in good working order. He shall in addition thereto inspect the tracks, bridges, and structures of all lines of railroad operating in this State, and in case he finds such track, bridge or structure defective or unsafe in any particular, he shall report such condition to the railroad commission and in addition thereto shall report the same to the divisional superintendent of such railroad. In case any track is found so defective as to be dangerous to the employees or traveling public for a train or trains to be operated over the same, the inspector is hereby authorized to condemn such track, bridge, or structure and notify the railroad commission and the railroad divisional superintendent of such road of his action concerning the same, reporting in detail the defects complained of, and the work and improvements necessary to be done to repair such defects. He shall also report to the railroad commission of Washington the violation of any law governing, controlling or affecting the conduct of railroads within this State. Such inspector shall have the right and privilege of riding upon any engine either on passenger or freight trains, or on caboose of freight train for the purpose of inspecting the track of any road in this State: *Provided*, That the engineer or conductor in charge of any such engine or caboose may require such inspector to produce his authority under the seal of the railroad commission of Washington showing that he is such inspector. The inspector shall be an employee of the railroad commission of Washington, and he shall perform in addition to the duties above described such other and further duties as the commission may require of him.

SEC. 17. There shall be added to said act to be designated as section 35 the following:

Sec. 35. Whenever the railroad commission of Washington has reasonable grounds to believe either on complaint made to it or otherwise that any of the tracks, bridges or other structures of any railroads in this State, or the couplers, air brakes, or automatic power brakes of any cars, tenders and engines, or the grab irons, ladders, and stirrups of any freight car used in this State are in a condition which renders them or any of them dangerous or unfit

for the transportation of passengers or the carrying of freight, it shall forthwith cause the same to be inspected and examined, and if on such examination of said commission or its inspector or agents it is of the opinion that any such tracks, bridges, structures, cars, tenders or engines are unfit for the transportation of passengers and freight with safety, it shall immediately give to the superintendent or other executive officer of the company operating such road notice of the condition thereof and of the repairs or reconstruction necessary to place the same in a safe condition, and it may also prescribe the rate of speed for trains passing over such dangerous or defective track, bridge or other structure until the repairs or reconstruction required are made, and may also prescribe the time within which such repairs or reconstructions must be made, or if in its opinion it is needful or proper, it may forbid the running of passenger trains over such defective track, bridge or structure until such repairs are made. If any superintendent or other executive officer receiving such notice and order neglects for two days after receiving the same to direct the proper subordinate officer to run the trains over such defective track, bridge or other structure at a speed not greater than that so prescribed, or if the running of such trains is forbidden, then to stop running trains over the same, or if any engineer, conductor or other employee knowingly disobeys such order, every superintendent, officer, engineer, conductor or employee so offending shall be fined in any sum not exceeding five hundred dollars, or be imprisoned for any period not exceeding one year, or both, at the discretion of the court; and the company operating such road, if it neglects or without good cause fails to make the repairs or reconstruction prescribed by the commission in the time limited shall for each day that such repair or reconstruction is delayed beyond the time prescribed, forfeit and pay to the State the sum of one hundred dollars. * * *.

SEC. 18. There shall be added to said act to be designated as section 36 the following:

Sec. 36. Any railroad whose superintendent, officer or agent shall receive such notice of a defective coupler, brake or other defect rendering the use of such car, tender or engine dangerous shall cause the same to be immediately repaired. On receiving from the inspector an order condemning any car, tender or engine, the employees of the road in charge of said car, tender or engine shall put the same out of service at the first freight divisional terminal, or, in case the inspector so orders, at the first station reached. Any railroad whose superintendent, officer or agent shall receive notice of a defect in the track, or any bridge or other structure, shall cause the same to be immediately repaired and on receiving from the commission an order condemning the track, bridge or structure, no train excepting for the purpose of repairing shall be run over the same until the defects pointed out are remedied and repaired.

SEC. 19. There shall be added to said act to be designated as section 37 the following:

Sec. 37. It shall be the duty of the general manager, superintendent or other proper officer of every railroad operating in this State to make to the railroad commission of Washington at its office a monthly report under oath of all the collisions of trains, or where any train or part of a train accidentally leaves the track, and of all accidents which may occur to its passengers or employees while in the service of such road and actually on duty, which report shall state the nature and cause thereof and the circumstances connected therewith: *Provided, however*, That neither said report nor any part thereof shall be admitted as evidence or used for any purpose against such railroad so making such report in any suit or action for damages growing out of any matter mentioned in said report; that the railroad commission of Washington is hereby authorized to prescribe for such railroad a method and form of making the report in this section provided.

SEC. 20. There shall be added to said act to be designated as section 38 the following:

Sec. 38. Any railroad, divisional superintendent, agent, officer or employee of any railroad operating in this State who shall willfully and knowingly violate any of the provisions of this act shall be deemed guilty of a misdemeanor and on conviction thereof shall be fined in any sum not exceeding five hundred dollars.

Approved by the governor March 16th, 1907.

CHAPTER 231.—*Employment of children—School attendance.*

[See Bulletin No. 73, p. 806.]

WEST VIRGINIA.

ACTS OF 1907.

CHAPTER 59.—*Hours of labor of telegraph operators, etc., on railroads.*

SECTION 1. It shall be unlawful for any person, corporation or association, operating a railroad within this State to permit any person employed by them, or on their railroad, in the capacity of telephone or telegraph operator, whose duty it is to space or block trains or engines, or handle train orders governing the movement of trains or engines, or handling interlocking switches governing the movement of trains or engines, to permit such telephone or telegraph operator so employed to be on duty more than eight hours in any twenty-four consecutive hours: *Provided*, That the provisions of this act shall apply only to such parts of a railroad where three or more passenger trains pass each way in twenty-four consecutive hours, or where ten or more freight trains pass each way in twenty-four consecutive hours, or at any office where said telegraph or telephone operators are employed twenty or more hours in twenty-four consecutive hours: *And provided further*, That in case of necessity caused by the sickness of any such operators or by an accident on such railroad, such telephone and telegraph operators may be permitted to be on duty for a period of twelve consecutive hours in any twenty-four consecutive hours, but such extension of time shall extend only for a period long enough to enable such railroad company to supply the required number of operators at such office, and shall in no case extend over a period of more than two days, nor under this provision shall it be lawful for any telegraph or telephone operator to be on duty twelve consecutive hours in any twenty-four consecutive hours for more than three times in any calendar month; but nothing in this act shall prevent any such company and operator agreeing to a longer day than eight hours, but in no case shall any such operator be permitted to be on duty longer than twelve consecutive hours in any twenty-four consecutive hours under such agreement.

SEC. 2. Any person, corporation or association convicted of violating the provisions of this act shall be guilty of a misdemeanor and pay a fine of one hundred dollars for the first offense, and for each offense committed after the first conviction hereunder, pay a fine of three hundred dollars.

Approved by the governor February 25, 1907.

CHAPTER 78.—*Mine regulations.*

SECTION 1. There is hereby created an executive department to be known as the "department of mines" which shall have for its purpose the supervision of the execution and enforcement of all State laws pertaining to the inspection of mines, heretofore and hereafter enacted for the safety of persons employed within or at the mines within this State, and the protection of mine property and other property used in and in connection therewith; and the said department of mines shall be in charge of an official to be known as the chief of the department of mines, who shall have full charge of said department, and who shall superintend and direct the inspection of mines as herein provided and as provided by any other State law not in conflict with this act.

The chief of the department of mines shall keep a record of all inspections made by himself and the district mine inspectors, which shall be a permanent record properly indexed; the record of the department of mines shall at all times be open to inspection by any citizen of this State, and upon the request of the governor of the State the chief of the department of mines shall lay said records before said officer, also maps of mines furnished the chief of the department of mines by the district mine inspectors; any chief of the department of mines who shall violate any of the provisions of this act shall, upon conviction, be fined not less than twenty-five nor more than two hundred dollars, and may in the discretion of the court be imprisoned in the county jail not exceeding one year.

The chief of the department of mines shall be a male citizen of West Virginia, and shall be a competent person, having had at least eight years' experience in the working, ventilation and drainage of coal mines in this State, and

having a practical and scientific knowledge of all noxious and dangerous gases found in such mines, and to enable the said chief of the department of mines to perform his duties he shall have the same authority to visit, enter and examine, the mines as is conferred upon the district mine inspector, and he shall have the authority to call the assistance of any one of the district mine inspectors to any district in the State.

The present chief mine inspector of this State, who according to this act, is designated as chief of the department of mines, shall continue in office under the title of chief of the department of mines until July one, one thousand nine hundred and nine, the expiration of the term for which he was appointed as chief mine inspector, or until his successor shall be duly appointed and qualified, unless sooner removed as provided by law; and the governor of this State, shall with the consent of the senate, appoint a chief of the department of mines whose term of office shall begin July one, one thousand nine hundred and nine, and shall be for four years, or until his successor shall be duly appointed and qualified; and the governor, with the consent of the senate, shall each four years thereafter, appoint a chief of the department of mines for the term of four years or until his successor be appointed and qualified.

The salary of the chief of the department of mines shall be twenty-four hundred dollars, and traveling expenses, which shall be paid monthly out of the state treasury upon a requisition upon the state auditor, properly certified by the chief of the department of mines.

SEC. 2. Within thirty days after this act becomes a law the chief of the department of mines shall appoint such an additional number of district mine inspectors, which with those now in office, shall give one inspector for each mining district within the State, as hereinafter provided, whose term of office shall expire the first day of July, one thousand nine hundred and nine, or when their successors be appointed and qualified, unless sooner removed as provided by law, and he shall direct or prescribe in which of said districts each of said inspectors shall serve; and he shall each four years thereafter appoint one inspector for each of said districts.

The salary of each district mine inspector shall be eighteen hundred dollars per annum, and actual expenses; such salary and expenses shall be paid monthly out of the state treasury upon the approval of the chief of the department of mines: *Provided*, That before payment of such expenses shall be made to the inspector he shall file an account of such expenses, verified by his affidavit, showing that they accrued in the discharge of his official duties; every person so appointed district mine inspector must be a citizen of West Virginia, having a practical knowledge of mining and the proper ventilation and drainage of mines and a knowledge of the gases met with in coal mines, and must be a miner of at least six years' experience in coal mines, or having otherwise been engaged as an employee for six years within coal mines, and he shall not while in office, be interested as owner, operator, agent, stockholder, superintendent or engineer of any coal mine, and he shall be of good moral character and temperate habits. An inspector of mines shall be removed from office by the chief of the department of mines of this State for incompetency, neglect of duty, drunkenness, malfeasance and for other good causes.

Each of the district mine inspectors shall report in writing monthly to the chief of the department of mines the number and condition of all mines inspected by him during each month and shall deliver to the operator or operators of each mine inspected a certificate of inspection, and shall post a duplicate certificate at a prominent place of the operating company where it may be conveniently read by any of the mine employees; said duplicate certificate shall remain posted until a subsequent certificate is issued by the district mine inspector, and he shall visit each mine in his district at least once in every three months, or oftener if called upon in writing by ten men engaged in any one mine, or the owner, operator or superintendent of such mine and make a personal examination of the interior of all mines, and outside of the mine where any danger may exist to the workmen in their respective districts, and shall particularly examine into the condition of the mines as to ventilation, drainage and general safety and shall make a report of such examinations, and he shall see that all the provisions of the mining statutes are strictly carried out; and it shall be unlawful for any district mine inspector to appoint any deputy or other person to do and perform any work required of such inspector; any mine inspector failing to comply with the requirements of this act shall be guilty of a misdemeanor, and upon conviction thereof shall be fined not less than one hundred dollars nor more than five hundred dollars and be dismissed from office; the chief of the

department of mines and the district mine inspectors shall each before entering upon the discharge of his duties take oath of office prescribed by the constitution and shall furnish bond in the sum of two thousand dollars, with security to be approved by the governor, conditioned upon the faithful discharge of his duty, a certificate of which oath and bond shall be filed in the office of the secretary of state. Vacancies in the office of the department of mines or district mine inspector shall be filled by appointment for the unexpired term.

SEC. 3. Each district mine inspector shall, for each year ending the thirtieth day of June, make a written report to the chief of the department of mines of his proceedings, stating therein the number of mines in his district, the improvements made in and at the mines, the extent to which this act is obeyed or violated, and such other information in relation to mines and mining as he may deem of public interest, or as may be required of him by the chief of the department of mines; he shall also suggest or recommend such legislation on the subject of mining as he may think necessary; such report shall be filed with the chief of the department of mines on or before the thirtieth day of September next succeeding the year for which it was made; the chief of the department of mines shall annually make a full and complete written report of his proceedings to the governor of the State for the year ending the thirtieth of June; such report shall include the reports of the district mine inspectors, the number of visits and inspections made in the State by the district inspectors, the quantity of coal and coke produced in the State, the number of men employed, number of mines operated, ovens in and out of blast, improvements made, prosecutions, etc., and such other information in relation to the subject of mines, mining inspection and needed legislation as he may deem of public interest and beneficial to the mining interests of the State; such report shall be filed with the governor on or before the thirtieth day of December next succeeding the year for which it was made, and such report shall be printed upon the requisition of the governor and in order that the report shall be annually printed and distributed among the operators, miners and citizens of the State, the sum of fifteen hundred dollars annually is hereby appropriated out of the state treasury for this special purpose.

SEC. 4. The chief of the department of mines, by and with the approval of the governor, shall within thirty days after this act becomes a law, divide the State into twelve mining districts in such a manner as to equalize as far as practicable the work of each district inspector.

SEC. 5. The operator or agent of every coal mine shall, within six months after the passage of this act, make or cause to be made, unless already made and filed, an accurate map or plan of such mine, on a scale to be stated thereon, of one hundred or two hundred feet to the inch; such map or plan shall show the openings or excavations, the shafts, slopes, entries, air ways with darts or arrows showing direction of air currents, headings, rooms, pillars, etc., and such portions of such mine or mines as may have been abandoned, the general inclination of the coal strata, and so much of the property lines and the outcrop of the coal seam of the tract of land on which said mine is located, as may be within one thousand feet of any part of the workings of such mine; a true copy of such map or plan, shall within the six months aforesaid be delivered by such operator to the inspector of his district, to be preserved among the records of his office and turned over to his successor in office; but it is provided that in no case shall any copy of the same be made without the consent of the operator or his agent; and the original map, or a true copy thereof, shall be kept by such operator at the office of the mine, and open at all reasonable times for the examination and use of the inspector, and such operator shall, twice within every twelve months, and not more than seven months apart, while the mine is in operation, cause such mine to be surveyed and the map thereof extended so as to accurately show the progress of the workings, the property lines and outcrop as above provided; and he shall immediately thereafter notify the inspector of his district who shall forward to the said operator, or his engineer the maps held by such inspector to be extended as above required.

SEC. 6. If the operator or agent of any coal mine shall neglect or fail to furnish to the mine inspector of his district any copy of map or extension thereof as provided in preceding section of this act, the mine inspector is hereby authorized to cause a correct survey and map or plan of said coal mine or the extension thereof to be made at the expense of the operator of such mine, the cost of which shall be recoverable from said operator as other debts are recoverable by law, and if at any time the chief of the department of

mines have reason to believe that such map or plan or extension thereof furnished in pursuance of the preceding section, be materially incorrect such as will not serve the purpose for which it was intended, he may have survey and map or plan or the extension thereof made or corrected and the expense of making such survey and map or plan or extension thereof under the direction of said chief of the department of mines, shall be paid by the operator and the same may be collected as other debts are recoverable by law; and if found correct the expense thereof to be paid by the State.

SEC. 7. After the passage of this act, each operator of a coal mine, before making any additional mine openings, shall furnish the district mine inspector of the district in which the mine is located, a plan of the proposed openings and mine development.

SEC. 8. After six months from and after the passage of this act, it shall be the duty of the mine foreman or the assistant mine foreman of every coal mine in this State to see that every person employed to work in such mine shall, before beginning to work therein, be instructed as to the particular danger, incident to his work in such mine, and furnished a copy of the mining law and rules of such mine.

Every inexperienced person so employed shall work under the direction of the mine foreman, his assistant or such other experienced worker as may be designated by the mine foreman or assistant until he is familiar with the danger, incident to his work, and it shall be unlawful for the operator, agent or mine foreman of any coal mine, to employ any person to work in said mine, or permit any persons to be in said mine for the purpose of working therein, unless they are in communication with at least two openings or outlets, separated by natural strata, of not less than one hundred feet in breadth, if the mine be worked by shaft, and of not less than fifty feet in breadth at the outlets, if worked by slope or drift: to each of said outlets there shall be provided from the interior of the mine, a safe and available roadway properly drained, which shall at all times, while the mine is in operation, be kept free from all obstructions that might prevent travel thereon in case of an emergency, and if either of said outlets be by shaft, it shall be fitted with safe and available appliances, such as stairs or hoisting machinery, which shall at all times, when the mine is in operation, be kept in order and ready for immediate use, whereby persons employed in the mine may readily escape in case of an accident.

This section shall not apply to any mine while work is being prosecuted with reasonable diligence in making communication between said outlets, necessary repairs and removing obstructions, so long as not more than twenty persons are employed at any one time in said mine; neither shall it apply to any mine, or part of a mine, in which a second outlet has been rendered unavailable by reason of the final robbing of pillars, preparatory to abandonment; so long as not more than twenty persons are employed therein at any one time.

For violation of this section the operator, agent or mine foreman, shall, upon conviction, be fined not less than fifty nor more than five hundred dollars, or be imprisoned in the county jail not less than ten nor more than ninety days, in the discretion of the court.

SEC. 9. The operator or agent of every coal mine worked by shaft shall forthwith provide, and hereafter maintain, a metal tube from the top to the bottom of such shaft suitably adapted to the free passage of sound through which conversation may be held between persons at the top and at the bottom of the shaft, also the ordinary means of signaling, and an approved safety catch and a sufficient cover overhead on every carriage used for lowering or hoisting persons, and at the top of the shaft an improved safety gate, and an adequate brake on the drum of every machine used to lower or hoist persons in such shaft; and the said operator or agent shall have the machinery used for lowering or hoisting persons into or out of the mine be kept in safe condition and inspected once in each twenty-four hours, by some competent person; and there shall be cut out or around the side of hoisting shaft or driven through the solid strata at the bottom thereof a traveling way of not less than five feet high and three feet wide to enable a person to pass the shaft in going from one side of it to the other without passing over or under the cage or other hoisting apparatus.

Any operator or agent who shall fail or refuse to comply with the requirements of this section shall be guilty of a misdemeanor and upon conviction shall be fined not less than fifty nor more than five hundred dollars, or be imprisoned in the county jail not less than thirty days nor more than one year, in the discretion of the court.

SEC. 10. No operator or agent of any coal mine, worked by shaft or slope, shall place in charge of any engine, used for lowering into or hoisting out of said mine persons employed therein, any but competent and sober engineers; and no engineer in charge of such machinery shall allow any person except such as may be deputed for that purpose by the operator or agent, to interfere with any part of the machinery; and no person shall interfere with or intimidate the engineer in the discharge of his duties; and in no case shall more than ten persons ride on any cage or car at one time, and no person shall ride on a loaded cage or car in any shaft or slope.

All slopes, engine planes or motor roads used by persons in any mine, shall be made of sufficient width to permit persons to pass moving cars with safety, or refuge holes of ample dimensions, and not more than sixty feet apart, shall be made on one side of said slope, engine plane or motor roads; such refuge holes shall be kept free from obstructions, and the roof and side thereof shall be made secure and be kept whitewashed at all times; no person shall travel on foot to or from his work upon any slope, engine plane or motor roads when other good roads are provided for that purpose.

For violation of the foregoing provisions of this section the operator or agent or miner shall, upon conviction, be fined not less than fifty nor more than five hundred dollars, or be imprisoned in the county jail not less than ten nor more than ninety days, in the discretion of the court.

SEC. 11. The operator, agent or mine foreman of every coal mine, whether worked by shaft, slope or drift, shall provide and hereafter maintain for every such mine ample means of ventilation, affording no less than one hundred cubic feet of air per minute for each and every person employed in such mine, and as much more as the district mine inspector may require, which shall be circulated around the main headings and cross headings and working places, to an extent that will dilute, render harmless and carry off the noxious and dangerous gases generated therein; and as the working places shall advance break throughs for air shall be made not to exceed eighty feet apart in pillars, or brattice shall be used, so as to properly ventilate the face, and all the break throughs between the intake and return air ways not required for the passage of air shall be closed with stoppings substantially built with suitable material, which shall be approved by the district mine inspector, so as to keep the working places well ventilated.

After six months from the passage of this act, not more than sixty persons shall be permitted to work in the same air current: *Provided*, That a larger number, not exceeding eighty persons may be allowed by the district mine inspector where, in his judgment, it is impracticable to comply with the foregoing requirement.

No operator, agent or mine foreman shall permit any person to work where they are unable to maintain at least one hundred cubic feet of air per minute, but this shall not be construed to prohibit the operator from employing men to make the place of employment safe and to comply with this requirement: *Provided, further*, That while the repair work necessary to get the mine in condition to comply with the law, no person or persons shall be permitted to enter that part of the mine affected except those actually employed in doing the necessary repair work.

In all mines, accumulation of fine dry coal dust, shall as far as practicable, be prevented and such dust shall be kept properly watered down.

For violation of the foregoing provisions of this section the operator, agent or mine foreman, shall upon conviction, be fined not less than fifty nor more than five hundred dollars, or be imprisoned in the county jail not less than ten nor more than ninety days, in the discretion of the court.

No miner or other employee shall take into any mine in this State any larger quantity of powder or other explosive than he may reasonably expect to use in any one shift, and all powder shall be carried into the mine in metallic canisters of a capacity not to exceed five pounds; any person violating this provision shall upon conviction, be fined five dollars for each offense or imprisoned in the county jail not exceeding ten days.

SEC. 12. In all mines generating fire damp and where there is every reason to believe that gas will be encountered in the future workings and developments of the mine, the minimum ventilation shall be one hundred and fifty cubic feet per minute for each and every person employed therein and as much more as one or more of the district mine inspectors may deem requisite and all stoppings on the main entries shall be substantially built with suitable material,

which shall be approved by the district mine inspector, so as to keep the working places well ventilated; doors on main haul ways shall be avoided in gaseous mines where practicable, and overcasts built of masonry or other incombustible material and of ample strength shall be adopted, and where doors are used they must be built in a substantial manner and hung so as to close automatically when unobstructed.

For violation of the foregoing provisions of this section the operator, agent or mine foreman, shall upon conviction, be fined not less than fifty nor more than five hundred dollars or be imprisoned in the county jail not less than ten nor more than ninety days, in the discretion of the court.

All old unused workings and abandoned parts of the mines must be protected by such safeguards as will prevent the dangerous overflow of any standing gas therein, and all avenues leading thereto shall be so arranged and conducted so as to give cautionary notice to all such workmen in such mines of the danger in entering therein; and in order to secure the safety of the workmen in general against the danger in said abandoned or worked out parts of the mines, notices shall be put up and kept standing, as far as practicable, which shall afford warning to all such workmen not to enter such parts of said mine; and in addition thereto, all persons, other than those specially charged with that duty, are hereby forbidden to enter such abandoned parts of such mines where gas may be found.

It shall be unlawful for any miner, after having exploded in any working place sixty cubical inches or more of powder, in one or more blasts, in any mine known to generate gas in large quantities, to enter such working place and attempt to resume work in any manner whatever with a naked light in less than twenty minutes after the blast has been exploded.

And for violation of these provisions of this act, such person or persons so offending shall be guilty of a misdemeanor, and upon conviction thereof shall be fined not less than five dollars nor more than one hundred dollars and be confined in the county jail not less than ten days nor more than one year. In all mines where explosive gas, or other gas of a dangerous or poisonous nature, is known to generate in dangerous quantities, the workmen shall be immediately instructed to withdraw from the mine in case of the stoppage of the fan, or heavy falls of the roof which may obstruct the main intake or return air way until such obstruction is removed.

SEC. 13. And it shall be unlawful in all mines where gas is being generated in dangerous quantities to use any other mechanical power for ventilation purposes except fan power, and the fan shall be kept in operation night and day unless written permission be granted by the chief of the department of mines or the district mine inspector in whose district the mine is situated; but no mine operator shall be required to keep such fan going where it is necessary to shut down for the purpose of repairing machinery or doing other work in the mines which may make it necessary.

It shall be the duty of every mine owner or operator in this State whose mine or mines are known to generate fire damp or other dangerous gas or gases, in dangerous quantities to employ a "fire boss" or "bosses" where necessary, who shall be a citizen or citizens of this State, and have such knowledge of fire damp and other dangerous gases as to be able to detect the same with the use of safety lamps and shall have a practical knowledge of the subject of the ventilation of mines and the machinery and appliances used for that purpose, and be a person with at least three years' experience in mines generating gases; it shall be the duty of said fire boss or bosses where employed in said gaseous mines to prepare a danger signal with suitable color at the mine entrance, and no person except the mine owner, operator or agent, and only then in case of necessity, shall pass beyond this danger signal until the mine has been examined by the fire boss, and the same or certain parts thereof reported by him to be safe; it shall further be the duty of said fire boss or bosses to go into all the working places of such mine or mines where gas is known to exist, or liable to exist in dangerous quantities, and carefully examine the same with a safety lamp, and do, or cause to be done, whatever may be necessary to remove from such working place or places, all dangerous gases and make the same safe for persons to enter therein as workmen in such mine or mines; such examination and removal of said gases shall begin within three hours before the time each shift commences work and it shall be the duty of the said fire boss at each examination to leave evidence of his presence at the face of every working place examined, and if the mine is safe he shall remove the danger signal, or change the color thereof to safety, in order that the

employees may enter said mine and begin work; in the performance of the duties on the part of the fire boss or bosses they shall have no superior officer, but all the employees working inside of said mine or mines shall be subordinate to said fire boss or bosses in this particular work; the fire boss shall upon having completed the examination of the mine before each shift, make a written record of the condition of the mine within a book having a form prescribed by the chief of the department of mines, which record shall at all times be kept at the mine subject to the inspection of the district mine inspector or chief of the department of mines; it shall be unlawful for any person to enter said mine or mines for any purpose at the beginning of work upon each shift therein until such signal or warning has been given by said fire boss or bosses on the outside of said mine or mines as to the safety thereof, as herein provided, except under the direction of said fire boss or bosses, and then for the purpose of assisting in making said mine safe; and each person who shall enter such mine except as aforesaid before such notice or signal has been given, or any operator, agent or fire boss who shall violate the provisions of this section, shall be guilty of a misdemeanor and upon conviction thereof shall be fined not less than fifty dollars nor more than five hundred dollars, or imprisoned in the county jail not less than sixty days nor more than one year.

SEC. 14. Mines in which explosive gas is generated in dangerous quantities from the coal or adjacent strata shall be worked exclusively by the use of locked safety lamps, and no open lamp nor torch shall be used except as may be permitted in writing by the district mine inspector; the safety lamps used for examining any mine or which may be used for working therein shall be furnished by, and be the property of the operator of the mine, and shall be in the charge of some person to be designated by the "fire boss" and at least two safety lamps shall be kept at every coal mine whether such mine generates fire damp or not.

Any operator, agent or other person who shall fail or refuse to comply with the requirements of this section shall be guilty of a misdemeanor and upon conviction shall be fined not less than fifty nor more than five hundred dollars, or be imprisoned in the county jail not less than thirty days nor more than one year, in the discretion of the court.

SEC. 15. In order to better secure the proper ventilation of every coal mine and promote the health and safety of persons employed therein, the operator or agent shall employ a competent and practical inside overseer, to be called mine foreman, who shall be a citizen of this State, and an experienced coal miner, or any person having five years' experience in a coal mine, who shall keep a careful watch over the ventilating apparatus and the air ways, traveling ways, pumps and drainage; and shall see that as the miners advance their excavations, proper break throughs are made, to properly ventilate the mine, and that all loose coal, slate and rock overhead in the working places and along the haul ways be removed or carefully secured so as to prevent danger to persons employed in such mines; and that sufficient props, caps and timbers, as nearly as possible of suitable dimensions, are furnished for the places where they are to be used, and such props, caps and timbers shall be delivered and placed at such points as the rules for the government of each respective mine provide for them to be delivered; and every workman in want of props, cap pieces and timbers shall notify the mine foreman, or such other person who may be designated for that purpose, at least one day in advance giving the length and number of props or timbers and cap pieces he requires; but in case of an emergency the timbers may be ordered immediately upon the discovery of any danger; and it shall be the duty of each miner to properly prop and secure his place in order to make the same secure for him to work therein. The said mine foreman shall have all water drained and hauled out of the working places where the same is practicable, before the miners enter and said working places kept dry as far as practicable while the miners are at work; it shall be the duty of the mine foreman to see that the crosscuts are made as required by law and that the ventilation shall be conducted through said crosscuts into the rooms by means of check doors placed on the entries or other suitable places, and he shall not permit any room to be opened in advance of the ventilation current. Should the mine inspector discover any room, entry, air way or other working places being driven in advance of the air current contrary to the requirements of this act he shall order the workmen working such places to cease at once until the law is complied with.

And the mine foreman shall measure the air current at least twice each month at the inlet and outlet and at or near the faces of the advanced headings

and shall keep a record of such measurements in a book having a form prescribed by the chief of the department of mines. An anemometer shall be provided for this purpose by the operator of the mine.

And in mines in which the operations are so extensive that all the duties devolving upon the mine foreman can not be discharged by one man, competent persons having had three years' experience in a coal mine may be designated and appointed as assistants, who shall act under the mine foreman's instructions, and shall be responsible for their conduct in the discharge of their duties under such designation or employment.

On all haul ways space not less than ten feet long and two feet six inches wide, between the wagon and the rib, shall be kept open at distances not exceeding one hundred feet apart, in which shelter from passing wagons may be had; it shall further be the duty of the mine foreman to have bore holes kept not less than twelve feet in advance of the face, and, where necessary, on sides of the working places that are being driven toward and in dangerous proximity to an abandoned mine or part of mine suspected of containing inflammable gases or which is filled with water; on all haul ways where hauling is done by machinery of any kind, the mine foreman shall provide a proper system of signals and a conspicuous light, and also for the carrying of a conspicuous light on the front and rear of every trip or train of cars when in motion in a mine, and when hoisting or lowering of men occurs before daylight in the morning or at evening after darkness, at any mine operated by shaft, the said mine foreman shall provide and maintain at the shaft mouth a light of stationary character sufficient to show the landing and all surrounding objects distinctly, and sufficient light of a stationary character shall be located at the bottom of the shaft so that persons coming to the bottom may clearly discern the cages and other objects closely contiguous thereto; no cages on which men are riding shall be lifted or lowered at a rate of speed greater than six hundred feet per minute; no mine cars either empty or loaded, shall be hoisted while men are being lowered or hoisted, and no cage having an unstable self-dumping platform shall be used for the carrying of workmen unless the same is provided with some device by which the same may be securely locked when men are being hoisted or lowered into the mine.

At every mine where ten men are employed under ground it shall be the duty of the operator thereof to keep always on hand at the mine a properly constructed stretcher, a woolen and a water-proof blanket, and all necessary requisites which may be advised by medical practitioner employed by the company, and if as many as one hundred and fifty men [be] employed, two stretchers with the necessary equipments as above advised; the mine foreman, or his assistant, shall visit and examine every working place in the mine every alternate day while the miners of such places are at work and shall direct that each and every working place shall be secured by props or timbers whenever necessary, which shall be placed and used by the miners working therein as in this act provided, to the end that such working places shall be made safe, and the said mine foreman shall not permit nor shall anyone work in a place known to be unsafe unless it be for the purpose of making it safe. The mine foreman shall notify the operator or agent of the mine of his inability to comply with any of the requirements of this section, and it then shall become the duty of any operator or agent to at once attend to the matter complained of by the mine foreman, so as to enable him to comply with the provisions hereof if the same can be practically done. Any operator or agent of any coal mine, or other person who shall neglect to comply with the requirements of this section shall, upon conviction, be guilty of a misdemeanor and shall be fined not less than fifty nor more than five hundred dollars, or be imprisoned in the county jail not less than ten days nor more than ninety days at the discretion of the court. Any mine foreman or employee failing to comply with this section shall, upon conviction, be fined not less than five dollars, nor more than fifty dollars, or imprisoned in the county jail not less than ten days nor more than ninety days, in the discretion of the court.

SEC. 16. The operator or agent of every coal mine shall furnish the inspector proper facilities for entering such mine and making examinations or obtaining information; and if any inspector shall discover that any mine does not, in appliances for the safety of the persons employed therein, conform to the provisions of this act, or that by reason of any defect or practice in or at such mine the lives or health of persons employed therein, are endangered, he shall immediately, in writing, notify such operator or agent thereof, stating in

such notice the particulars in which he considers such mine to be defective or dangerous and if he deem it necessary for the protection of the lives or health of the persons employed in such mine, he shall, after giving notice of one day to the said operator or agent, in writing notify immediately the chief of the department of mines, who shall immediately examine the mine reported to be unsafe, and if upon such examination the mine reported to be unsafe is in fact found to be in an unsafe condition, the chief of the department of mines shall forthwith order the mine to be closed until it is placed in a safe and proper condition for mining operations; the owner or operator of any mine so closed may apply to the circuit court wherein such mine is located, or the judge thereof in vacation, by petition for an order directing said mine to be reopened, and such court or the judge thereof in vacation shall immediately hear and determine the matters arising upon such petition, and if upon full hearing thereof the court or the judge thereof in vacation shall find that said mine is in a reasonably safe condition, the prayer of said petition shall be granted; but notice of said hearing shall be given to the district mine inspector or the chief of the department of mines three days at the least before said hearing; and in all such hearings the attorney-general shall appear for the State and defend the same.

SEC. 17. No boy under fourteen years of age, nor female person of any age shall be permitted to work in any coal mine, and in all cases of doubt, the parents or guardians of such boys shall furnish affidavits of their ages; any operator, agent or mine foreman who shall knowingly violate the provisions of this section or any person knowingly making a false statement as to the age of any boy under fourteen years of age, applying for work in any coal mine shall, upon conviction, be fined not less than ten nor more than five hundred dollars, or be imprisoned in the county jail not less than ten nor more than ninety days, in the discretion of the court.

SEC. 18. No miner, workman or other person, shall knowingly injure any shaft, lamp, instrument, air course, or brattice, or obstruct or throw open air ways or carry matches or open lights in the places worked by safety lamps or disturb any part of the machinery or appliances, open a door used for directing ventilation and not close it again, or enter any part of a mine against caution, or disobey any order given in carrying out any of the provisions of this act, or do any other act whereby the life or health of any person employed in the mine or the security of the mine is endangered; any person who shall violate the provisions of this section shall, upon conviction, be fined not less than ten nor more than five hundred dollars, or be imprisoned in the county jail not less than ten nor more than ninety days, in the discretion of the court; when any operator of a mine shall in any manner refuse to furnish all supplies necessary for the mine foreman to comply with the requirements of this act after being so requested so to do and by reason of such refusal, loss of life or injury may result to any employee, a right of action for damages may ensue against the operator of the mine wherein such employee has not contributed to his own injury or loss.

SEC. 19. Nor shall any person or persons, or combination of persons, by force, threats, menaces, or intimidation of any kind, prevent or attempt to prevent from working in or about any mine, any person or persons who have the lawful right to work in or about the same, and who desires so to work; but this provision shall not be construed as to prevent any two or more persons from associating together under the name of Knights of Labor, or any other name they may desire, for any lawful purpose, or for using moral suasion or lawful argument to induce anyone not to work in and about any mine; any person or persons who shall violate the provisions of this section shall, upon conviction, be fined not less than fifty nor more than five hundred dollars, or be imprisoned in the county jail not less than ten days nor more than ninety days, in the discretion of the court.

SEC. 20. Whenever by reason of any explosion or other accident in any coal mine, or the machinery connected therewith, loss of life or serious personal injury shall occur, it shall be the duty of the superintendent of the colliery, and in his absence, the mine foreman in charge of the mine, to give notice forthwith, by mail or otherwise, to the inspector of the district, stating the particulars of such accident; and if anyone is killed thereby, to the coroner of the county also, or in his absence or inability to act, to any justice of the peace; and the said inspector shall, if he deem it necessary from the facts reported, immediately go to the scene of such accident and make such suggestion and render such assistance as he may deem necessary for the future safety of the

men and investigate the cause of such explosion or accident, and make a record thereof, which he shall preserve with the other records of his office; and to enable him to make such investigation, he shall have the power to compel the attendance of witnesses, and to administer oaths or affirmations; and the costs of such investigation shall be paid by the county in which such accident occurred, in the same manner as the costs of the coroner's inquests are now paid; if the coroner or justice shall determine to hold an inquest upon the body of any person killed, as aforesaid, he shall impanel a jury, no one of whom shall be directly or indirectly interested, and the inspector of mines, or the chief of the department of mines, if present at such inquest, shall have the right to appear and testify and to offer any testimony that may be relevant and to question and cross-question any witness; and the coroner or justice shall deliver to the inspector a copy of the testimony and verdict of the jury; any operator, agent, superintendent or mine foreman who shall fail to perform the duty provided in this section shall, upon conviction, be guilty of a misdemeanor, and shall be fined not less than ten nor more than five hundred dollars, or be imprisoned in the county jail not less than ten nor more than ninety days, in the discretion of the court.

SEC. 21. The operator or agent of every coal mine shall annually, during the month of July, mail or deliver to the chief of the department of mines, a report for the preceding twelve months, ending with the thirtieth day of June; such report shall state the names of the operators and officers of the mine, the quantity of coal mined and such other information, not of a private nature, as may from time to time be required by the chief of the department of mines; blank forms of such reports shall be furnished by the chief of the department of mines. At any time any person, company or corporation operating a coal mine shall transfer the ownership of any mine to another person, company or corporation, the person, company or corporation transferring such ownership shall within thirty days make a report to the chief of the department of mines of such change, and a statement of the tons of coal produced since the first of July, last, previous to the date of such sale or transfer of such mine or mines; any operator or agent failing to furnish the reports as required in this section shall be guilty of a misdemeanor and upon conviction, shall be fined not less than fifty nor more than five hundred dollars, or imprisoned in the county jail not less than thirty nor more than ninety days, in the discretion of the court.

SEC. 22. Any operator, agent, superintendent or mine foreman having in charge any mine, who shall knowingly permit any person to work in any part of a mine in violation of instructions issued by the mine inspector, made in compliance with the requirements of this act, shall upon conviction be fined not less than fifty nor more than one hundred dollars for each person permitted to work in violation of such instructions, and any employee who shall work in violation of such instructions shall, upon conviction, be fined not less than ten nor more than fifty dollars.

SEC. 23. In any mine in which solid shooting is done the district mine inspector is authorized to prescribe the conditions under which such solid shooting may be done.

SEC 24. No steam locomotive shall be used in mines where men are actually employed in the extraction of coal, except by the consent of the district mine inspector, but this shall not be construed to prohibit any mine owner from operating a steam locomotive through any tunnel, haul way or part of a mine that is not in actual operation and furnishing coal; any operator or agent who violates this section shall be guilty of a misdemeanor and upon conviction shall be fined not less than fifty nor more than five hundred dollars, or be imprisoned in the county jail not less than thirty nor more than ninety days, in the discretion of the court.

SEC. 25. There shall be adopted by the operator of every mine in this State special rules for the government and operation of his mine or mines, covering all the work pertaining thereto in and outside of the same, which however, shall not be in conflict with the provisions of the mining laws of this State; such rules when established shall be printed on card board, in the language spoken by ten or more employees, and shall be posted up in the drum house, tipple or some other conspicuous place about the mines where the same may be seen and observed by all the employees at such mines, and when said rules are so posted the same shall operate as a notice to all employees at such mine of their acceptance of the contents thereof; and it shall be the duty of each mine operator to furnish a printed copy of said rules to each of his employees when requested by either or any of them; any operator or agent who violates

the provisions of this section shall be guilty of a misdemeanor and upon conviction shall be fined not less than fifty nor more than five hundred dollars, or be imprisoned in the county jail not less than thirty nor more than ninety days, in the discretion of the court.

SEC. 26. In all prosecutions under this act the circuit court, criminal court and justices of peace have concurrent jurisdiction with the right of appeal to circuit court.

SEC. 27. The provisions of this act shall apply only to coal mines in which five or more persons are employed in a period of twenty-four hours; but no mine employing less than ten men shall be required to employ a mine foreman.

Approved by the governor February 27, 1907.

CHAPTER 82.—*Employment offices.*

SECTION 1. Sections * * * two, * * * one hundred and nine, * * * of chapter thirty-two of the Code of West Virginia * * * [shall] be amended and reenacted * * * so as to read as follows:

Section 2. No person without a state license therefor shall

(z) carry on the business of a labor agency:

* * * * * * *

Provided, That nothing in this chapter contained, and no license or payment under the provisions hereof, shall be taken to legalize any act which otherwise may be in violation of law, or exempt any person from any penalty prescribed for such violation.

Sec. 109. * * * on every license to conduct the business of a labor agency, one hundred dollars; any person or corporation who hires or contracts with laborers, male or female, to be employed by persons other than himself and to be transported out of the State for employment in another State, shall be deemed a labor agency within the meaning of this clause.

Approved by the governor February 27, 1907.

WISCONSIN.

ACTS OF 1907.[a]

Bureau of labor and industrial statistics.

[For section 1021h see Bulletin No. 73, p. 976.]

SECTION 1021t. The commissioner of labor and industrial statistics is authorized to employ, for his office, such extra assistants as he may from time to time deem necessary and fix their compensation: *Provided*, That the compensation so fixed by said commissioner of labor and industrial statistics, shall not exceed the amount fixed by law for similar services: *And provided further*, That the total amount expended for such extra assistants shall be paid out of moneys in the general fund not otherwise appropriated, and shall not in any one year, exceed two thousand five hundred dollars.

Approved July 9, 1907.

Accidents to be reported.

SECTION 1022–53. It shall be the duty of all physicians and surgeons practicing in this State to report within thirty days to the local registrar of vital statistics of the district, any accident to any person whom they are called upon to care for professionally when such person is thereby incapacitated from pursuing his usual vocation for a period of two weeks or more, using such form of certificate as may be provided by the state bureau of vital statistics.

Approved July 1, 1907.

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[a] All statutes amended or enacted in 1907 were arranged and numbered as of the Compiled Statutes of the State, in accordance with Joint Resolution No. 119, 1907. Amended sections are indicated below by the word "amended," in parenthesis, following the section number; other sections are new legislation.

Examination and licensing of barbers.

SECTION 1636–24 (amended). Any person desiring to obtain a certificate of registration under this act, shall make application to such board therefor, pay to the treasurer of said board an examination fee of one dollar, present himself at the next regular meeting of the board for the examination of applicants, and if he shows that he has studied and practiced the trade for two years as an apprentice under one or more practicing barbers, or for at least two years in a properly appointed and conducted barber school, under the instruction of a competent barber, or practiced the trade for at least two years in this State or other States, and that he is possessed of the requisite skill in such trade to properly perform all the duties thereof, including his ability in the preparation of the tools, shaving, hair cutting and all the duties and services incident thereto, and has sufficient knowledge concerning the common diseases of the face and skin to avoid the aggravations and spreading thereof in the practice of said trade, his name shall be entered by the board in the register hereafter provided for, and a certificate of registration shall be issued by him authorizing him to practice said trade in this State. All persons making application for examination under the provisions of this act, shall be allowed to practice the occupation of barbering until the next meeting of the board, and the board shall issue him a permit authorizing him to practice the said trade until the next meeting of the board.

SEC. 1636–25 (amended). 1. Nothing in this act shall prohibit any person from serving as an apprentice in said trade under a barber authorized to practice the same under this act, or from serving as a student in any barber school for the training of students in such trade under the training of a qualified barber.

2. Such apprentice or student shall apply to said board to have his name registered with said board in a book which shall be kept by the board for the registering of apprentices or students, and secure a permit to practice as an apprentice or student under the instructions of a qualified barber. After having practiced the trade for two years under a qualified barber such apprentice or student shall be eligible to become a registered barber and present himself at the next regular meeting of the board held nearest to him for the examination of applicants, and pay the fee of one dollar for examination as provided for in section 1636–24, Statutes of 1898.

SEC. 1636–28 (amended). Said board shall be authorized to adopt reasonable rules providing for the sanitary regulation of barber shops, subject to the approval of the state board of health, and shall have the power to enter any barber shop during business hours for the purpose of inspection of such shops. If any shop be found in an unsanitary condition, or if any barber working therein has been charged with imparting any contagious diseases, the board shall immediately notify the local health officer thereof, and such shop shall be quarantined, and the barber so charged shall not practice his occupation until such quarantine shall be removed by the health officer. Said board shall have the power to revoke any certificate of registration granted by it under this act, for conviction of crime, habitual drunkenness for six months immediately before a charge duly made, gross incompetency, failure to comply with the sanitary rules approved by the state board of health, or for having imparted any contagious or infectious diseases: *Provided*, That before any certificate shall be so revoked, the holder thereof shall have notice in writing of the charge or charges against him, and a day specified in said notice, at least five days after the service thereof, be given a public hearing and be given an opportunity to present testimony in his behalf and to confront the witness against him. Any person whose certificate has been revoked, may after the expiration of ninety days, apply to have his certificate regranted, and the same shall be regranted to him upon his giving satisfactory proof that the disqualification has ceased to exist.

SEC. 1636–30 (amended). Any person practicing the occupation of barber in this State, without having obtained a certificate of registration, as provided by this act, or willfully employ[ing] a barber who has not such a certificate, or falsely pretending to be qualified to practice such occupation under this act, or violating any of the provisions of this act, is guilty of a misdemeanor and upon conviction thereof, shall be punished by a fine of not less than ten dollars nor more than one hundred dollars, or by imprisonment in the county jail not less than ten days or more than ninety days.

Approved April 23, 1907.

Inspection of factories—Blowers for emery wheels.

[See Bulletin No. 73, pp. 979, 980.]

Regulation and inspection of bakeries.

[See Bulletin No. 73, pp. 980 to 982.]

Employment of children—Paid musicians.

[See Bulletin No. 73, pp. 810, 811.]

Employment of children—General provisions.

[See Bulletin No. 73, pp. 811 to 813.]

Height of wires above railroad tracks.

SECTION 1778a—1. It shall be unlawful for any person, firm or corporation to string any wire, electric or other, over the tracks of any steam railroad company except in accordance with the provisions of this section. All such wires shall be suspended over a double cross arm attached to a pole at each side of the crossing. The poles shall not be less than six inches in diameter at the top, set not less than five feet in the ground, securely guyed, and, unless the railroad right of way is not of greater width, shall be set not more than one hundred feet apart at such crossings. All such wires shall be tied to insulators on pins set in the cross arms. The cross arms shall be attached to the poles by machine bolts and braced by at least one iron brace from each cross arm to the pole. All such wires shall be maintained not less than twenty-five feet above the surface of the rails at such crossing except the street railway trolley wires shall be maintained not less than twenty-two feet above the surface of the rails at such crossings.

SEC. 1778a—2. The railroad commission of Wisconsin is hereby vested with authority to enforce the provisions of this act, and any person, firm or corporation ordered by the commission to change its wires so as to comply with this act failing to comply with such order within ten days from the service thereof shall be liable for a penalty or forfeiture of twenty-five dollars, and to a like penalty or forfeiture for every ten days during which it shall fail to comply with the order of the commission, unless a greater length of time to make such change shall be specified by the commission in said order, or upon cause shown.

* * *

Approved June 20, 1907.

Accidents on railroads.

SECTION 1797m—101. 1. Every public utility shall, whenever an accident attended with loss of human life occurs within this State upon its premises or directly or indirectly arising from or connected with its maintenance or operation, give immediate notice thereof to the commission.

2. In the event of any such accident the commission, if it deem the public interest require it, shall cause an investigation to be made forthwith, which investigation shall be held in the locality of the accident, unless for greater convenience of those concerned it shall order such investigation to be held at some other place; and said investigation may be adjourned from place to place as may be found necessary and convenient. The commission shall seasonably notify the public utility of the time and place of the investigation.

Approved July 9, 1907.

Age and qualifications of telegraph operators on railroads.

SECTION 1809j. 1. It shall be unlawful for any common carrier by railroad, carrying freight or passengers between points within this State, to employ any telegraph operator, except an assistant under an experienced operator, who shall not have attained the age of eighteen years and who shall not have had actual experience as a telegraph operator, or who shall not have had at least six months' actual experience under the tutorship of an experienced railroad telegraph operator, or who shall not have been graduated from a school of telegraphy having at least a six months' course.

2. Any common carrier by railroad or any of its officers or agents who shall violate the provisions of this act shall be deemed guilty of a misdemeanor and shall be punished by a fine of not less than one hundred dollars nor more than one thousand dollars for each offense.

Approved July 9, 1907.

Hours of labor of employees on railroads.

SECTION 1809l. It shall be unlawful for any common carrier, its officers or agents, to require or permit: (1) Any employee to be or remain on duty for a longer period than sixteen consecutive hours, and whenever any such employee of such common carrier shall have been continuously on duty for sixteen hours he shall be relieved and not required or permitted again to go on duty until he has had at least ten consecutive hours off duty; and no such employee who has been on duty sixteen hours in the aggregate in any twenty-four hour period shall be required or permitted to continue or again go on duty without having had at least eight consecutive hours off duty.

SEC. 1809m. The provisions of this act shall not apply in any case of casualty or unavoidable accident or the act of God; nor where the delay was the result of a cause not known to the carrier or its officers or agents in charge of such employee at the time said employee left the terminal and which could not have been foreseen nor to the crews of wrecking or relief trains.

SEC. 1809n. The railroad commission shall fully investigate all cases of violation of this act and shall lodge with the proper district attorneys information of such violations as may come to its knowledge. The commission shall have the power to employ such inspectors or other persons as may be necessary to enforce the provisions of this act. To enforce the provisions of this act the railroad commission and its agents or employees shall have the power to administer oaths, interrogate witnesses, take testimony, and require the production of books and papers.

SEC. 1809o. Any common carrier or any of its officers or agents violating any of the provisions of section 1809l is declared to be guilty of a misdemeanor and upon conviction thereof shall be punished by a fine of not less than one hundred dollars nor more than one thousand dollars.

Approved July 16, 1907.

Railroad trains—Sufficient crews.

SECTION 1809r. It shall be unlawful for any railroad company doing business in the State of Wisconsin to run over its road, or part of its road, outside of the yard limits, any passenger train with three cars or less, with less than a full passenger crew, consisting of one engineer, one fireman, one conductor and one brakeman; for more than three cars, two brakemen; and on trains of more than three cars the said brakeman [brakemen] shall not be required to perform the duties of the baggage master or express agent while on the road. Nothing in this section shall apply to trains picking up a car or cars between terminals in this State, or to trains propelled by electricity.

SEC. 1809s. It shall be unlawful for any railroad company in the State of Wisconsin to run over its road, or any part thereof, outside of yard limits, any freight train of three cars or more with less than a full train crew consisting of five persons: one engineer, one fireman, one conductor, and two brakemen.

SEC. 1809t. Any superintendent or train master or their assistants or any other officer, or employee of any railroad company doing business in the State of Wisconsin, operating more than twenty-five miles of road who shall send out on the road, or cause to be sent out on the road, outside of yard limits, any passenger train or any freight train whose crew consists of less than the number required in sections 1809r and 1809s of this act, shall be guilty of a misdemeanor, and upon conviction shall be fined not less than fifty dollars for each offense.

SEC. 1809u. The circuit courts of the several counties of this State shall have jurisdiction of offenses under this act.

Approved June 25, 1907.

Liability of railroad companies for injuries to employees.

SECTION 1816 (amended). Every railroad company shall be liable for damages for all injuries whether resulting in death or not, sustained by any of its employees, subject to the provisions hereinafter contained regarding contributory negligence on the part of the injured employee:

1. When such injury is caused by a defect in any locomotive, engine, car, rail, track, roadbed, machinery or appliance used by its employees in and about the business of their employment.

2. When such injury shall have been sustained by any officer, agent, servant or employee of such company, while engaged in the line of his duty as such and which such injury shall have been caused in whole or in greater part by the negligence of any other officer, agent, servant or employee of such company, in the discharge of, or by reason of failure to discharge his duties as such.

3. In every action to recover for such injury the court shall submit to the jury the following questions: First, whether the company, or any officer, agent, servant or employee other than the person injured was guilty of negligence directly contributing to the injury; second, if that question is answered in the affirmative, whether the person injured was guilty of any negligence which directly contributed to the injury; third, if that question is answered in the affirmative, whether the negligence of the party so injured was slighter or greater as a contributing cause to the injury than that of the company, or any officer, agent, servant or employee other than the person so injured; and such other questions as may be necessary.

4. In all cases where the jury shall find that the negligence of the company, or any officer, agent or employee of such company was greater than the negligence of the employee so injured, and contributing in a greater degree to such injury, then the plaintiff shall be entitled to recover, and the negligence, if any, of the employee so injured shall be no bar to such recovery.

5. In all cases under this act the question of negligence and contributory negligence shall be for the jury.

6. No contract or receipt between any employee and a railroad company, no rule or regulation promulgated or adopted by such company, and no contract, rule or regulation in regard to any notice to be given by such employee shall exempt such corporation from the full liability imposed by this act.

7. The phrase "railroad company," as used in this act, shall be taken to embrace any company, association, corporation or person managing, maintaining, operating, or in possession of a railroad in whole or in part within this State whether as owner, contractor, lessee, mortgagee, trustee, assignee or receiver.

8. In any action brought in the courts in this State by a resident thereof, or the representative of a deceased resident, to recover damages in accordance with this act, where the employee of any railroad company owning or operating a railroad extending into or through this State and into or through any other State or States shall have received his injuries in any other State where such railroad is owned or operated, and the contract of employment shall have been made in this State, it shall not be competent for such railroad company to plead or prove the decisions or statutes of the State where such person shall have been injured as a defense to the action brought in this State.

9. The provisions of this act shall not apply to employees working in shops or offices.

Approved June 19, 1907.

Hours of labor of train dispatchers.

SECTION 1816m. It shall be unlawful for any corporation or a receiver operating a line of railroad, in whole or in part, in the State of Wisconsin, or any officer, agent or representative of such corporation or receiver, to require or permit any operator to remain on duty for more than one period of eight consecutive hours, and when said operator shall have been on duty for said eight hours he shall be relieved and not required or permitted again to go on duty until he has had at least sixteen consecutive hours off duty in any twenty-four hours: *Provided*, This provision shall not apply in case of casualty upon such railroad; in which case said operator may be required or permitted to be on duty not more than one period of twelve consecutive hours in any twenty-four hours, or not to exceed three days of said twelve successive hours each at one time.

2. The term "operator" shall include train dispatchers, and shall be defined and construed to mean an employee who, by the use of the telegraph or telephone dispatches, or reports, transmits, receives or delivers orders pertaining to or affecting the movement of cars, engines, or trains, or who handles such cars, engines, or trains by or under what is known and termed the block sys-

tem; the term "block system" shall be defined and construed to mean reporting cars, engines, or trains to another office or offices and to the train dispatcher registering the same and operating one or more order or signal devices, and manipulating signal devices affecting the movement of cars, engines, or trains from stations or towers in railroad yards or on main tracks.

3. Whenever the railroad commission shall learn of any violation of this section by any company or by an officer or agent of any such company, it shall be the duty of the railroad commission to investigate such violation at once and it shall have power to require such company to immediately provide such additional employees as are necessary to comply with the provisions of this act.

4. The failure to comply with any of the provisions of this section shall subject the corporation or receiver or any officer, agent or representative of such corporation or receiver to a penalty of not less than one thousand dollars nor more than five thousand dollars for each offense, to be sued for and recovered in the name of the State, with the costs of prosecution, by the attorney-general or under his direction, or by the district attorney for any county in which the violation may occur, and in the circuit court for such county, and such penalty, when recovered, shall be paid into the county treasury of the county in which the violation occurred, for the benefit of such county.

Approved July 11, 1907.

Railroads—Penalties and liabilities.

SECTION 1819 (amended). 1. If any railroad corporation, its officers, agents or servants, violate or fail to comply with any provisions of sections 1798 to 1817 inclusive, such corporation shall for every violation or failure, forfeit not less than ten nor more than one thousand dollars, and be liable to the person injured for all damages sustained thereby.

2. All forfeitures recovered shall inure to the State

Approved July 13, 1907.

Protection of workingmen as members of the national guard.

SECTION 4423m. A person who, either by himself or with another, willfully deprives a member of the national guard of his employment, or prevents his being employed by himself or another, or in respect to his trade, business or employment, because said member of said national guard is such member, or dissuades any person from enlistment in the said national guard by threat of injury to him in case he shall so enlist, in respect to his employment, trade, or business, shall be deemed guilty of a misdemeanor and upon conviction thereof shall be punished by a fine of not less than ten dollars nor more than twenty-five dollars, or by imprisonment in the county jail for not less than ten days nor more than twenty days.

SEC. 4423n. No association or corporation, constituted or organized for the purpose of promoting the success of the trade, employment, or business of the members thereof, shall by any constitution, rule, by-law, resolution, vote or regulation, discriminate against any member of the National Guard of the State of Wisconsin, because of such membership in respect to the eligibility of such member of the said national guard to membership in such association or corporation, or in respect to his right to retain said last mentioned membership. It is the purpose of this section and the section immediately preceding to protect a member of the said national guard from disadvantage in his means of livelihood and liberty therein but not to give him any preference or advantage on account of his membership in said national guard. A person who aids in enforcing any such provisions against a member of the said national guard with the intent to discriminate against him because of such membership, shall be deemed guilty of a misdemeanor and upon conviction thereof shall be punished by a fine of not less than ten dollars nor more than twenty dollars, or by imprisonment in the county jail for not less than ten days nor more than twenty days.

Approved July 1, 1907.

CUMULATIVE INDEX OF LABOR LAWS AND DECISIONS RELATING THERETO.

[This index covers the Tenth Special Report of the Commissioner of Labor, which is a compilation of the labor laws, both Federal and State, in force at the close of the year 1903; it also covers labor laws subsequently enacted and published in Bulletins Nos. 57 to 79 of this office, as well as the compilations published in Bulletin No. 73. Many of the laws contained in the Tenth Special Report are followed by brief notes on the decisions of courts relating to them. Similar decisions reproduced in the Bulletin since the publication of the Tenth Special Report are indexed under the appropriate headings, and are indicated by the letter "D" in parenthesis following the name of the State. Opinions of the Attorney-General on the construction, etc., of labor laws are similarly indexed, and are indicated by the abbreviation "Op." in parenthesis.]

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